The IRON AGE

June 4, 1959 A Chilton Publication The National Metalworking Weekly

Boyden Associates' S. M. Boyden—

Will You Be Ready for Business Leadership? P. 101

Special Finishing Show Feature:

★ New Handbook

On Metal Finishing – P. 125

Why Steel Men Worry – P. 89

Digest of the Week – P. 2-3

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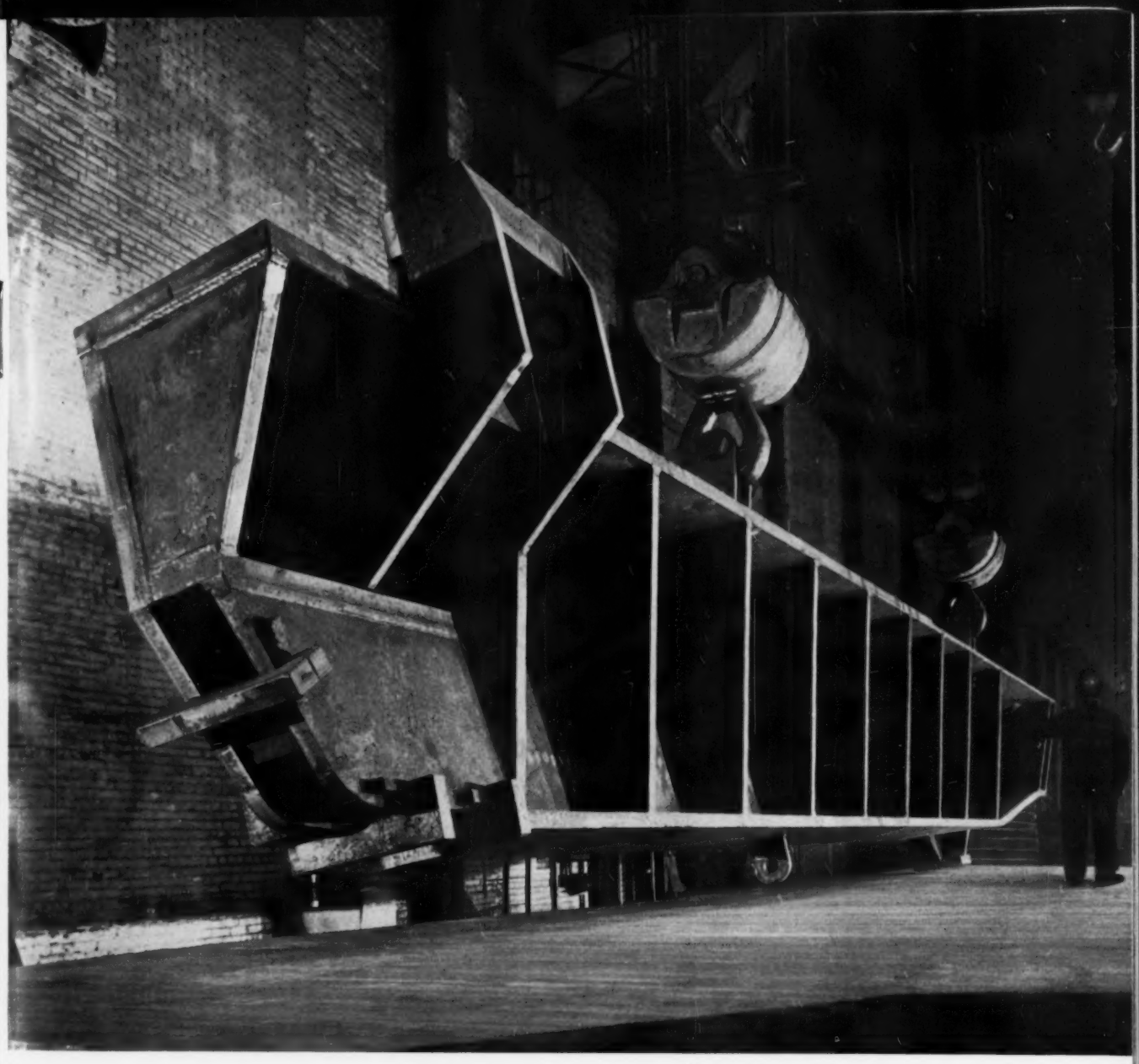

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June 4, 1959—Vol. 183, No. 23

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United Management Front—Steel leaders say they are set on beating down union demands for higher pay. But they are worried about pressures that may build up if they take a strike. P. 89

MOBILITY IN DEFENSE

Lighter Metals Stressed — Military planners are convinced mobil-

ity will be a major factor in a modern war. Nonferrous metals are making new inroads. P. 92

BATTLE OF THE BUDGET

Victory for Ike—The President's military budget, despite all the criticism, is expected to go into effect July 1 with little change. The total: $40.8 billion. P. 109

SHELL PARTS PRODUCTION

A New Method—Floturn Div., Lodge & Shipley Co., is testing a new process that makes shell parts in six steps, compared to 10 in standard deep drawing method.

Metalworking

BUSINESS LEADERSHIP: S. M. Boyden is head of one of the country's leading executive research firms. Drawing on his experience, Mr. Boyden outlines the qualities that can lead to the executive level, plus tips on mistakes to avoid in charting your progress. P. 101

Savings are reported in time, tooling, and materials. P. 113

DEFENSE CONTRACT BATTLE

It's East Versus West — New York is asking Congress to change rules for awarding defense contracts. But Farwest will oppose any idea government should consider geographic areas in making awards. P. 111

FINISHING FEATURES

METAL CLEANING AND FINISHING HANDBOOK

For a Wide Field — Practically every metal product must be finished before it goes to market. That's why metal finishing cuts across the entire metalworking industry and covers over a score of different operations. P. 125

Surface Treating — The section leads off with spot tests for identification of metal surfaces. Tables cover phosphate surface treatments, surface treatments of aluminum alloys and chemical treatments for magnesium alloys. P. 127

Cleaning and Pickling — Tables cover acid dipping formulas and typical immersion and spray cleaning operations. Comparisons are made between pickling, degreasing, cleaning and descaling. Other subjects covered are chlorinated solvents, drying times and temperatures, and organic coatings. P. 130

Mechanical Finishing — Deburring and finishing methods with both non-metallic and metallic mediums are listed in tables. Polishing wheel grit sizes and how to select power brushes are other table headings. P. 135

Plating Processes—Metallic coatings are listed as specified by U. S. Government. Specification plating includes data on cadmium, brass, copper, silver, chromium, nickel, cobalt, tin and zinc. P. 140

Glossary of Terms—This section lists definitions of terms likely to be of use in metal finishing departments. P. 145

MARKETS & PRICES

REPORT TO MANAGEMENT

Few Weak Spots—Most encouraging aspect of the business advance is that it is moving ahead on a broad front. Steel executives' second half optimism dispels many lingering doubts. P. 99

EQUIPMENT FOR HIRE

Popular Service—General Electric's new equipment rental service is catching on fast. The company expects to expand its rental pool of 13,000 instruments. P. 94

AUTOMOTIVE STAINLESS

New Market Push—Big volume potential of automotive market is attractive to stainless steel producers. Allegheny Ludlum takes the initiative in latest sales promotion campaign. P. 105

LABOR STATESMANSHIP?

It's a Possibility—There's always the chance that steel labor will decide to be "statesmanlike" in the interest of peace. But the odds still favor a strike. P. 181

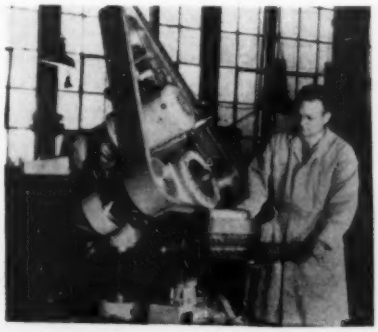
STEEL FOUNDRY SALES

Strong Comeback — Steel founders have moved well away from last year's recession lows. With new bookings at strong levels, 1959 shipments may reach 1.6 million tons. P. 182

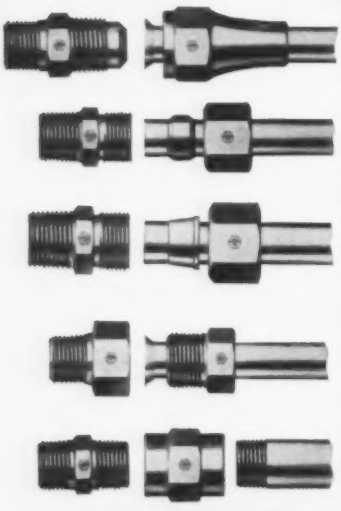
NEXT WEEK

ABRASIVE-BELT POLISH

Before Forming?—Next week's technical feature takes up the question as to whether a part should be finished before or after forming. A fast-growing idea is abrasive-belt grinding and finishing of flat stock before forming.



brass tube fittings



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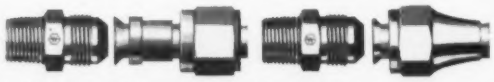

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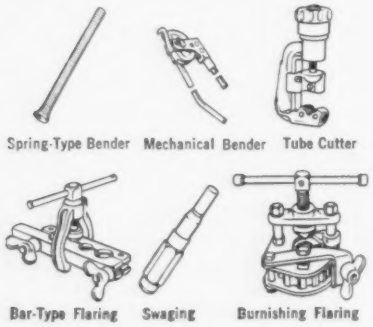

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When selected, he may have been fresh from school or service. But it's just as likely he was already an Armco man with practical mill experience. In any case, he was a college graduate with business or engineering background.

The "postgraduate" studies he then began were tough and thorough—complete with lectures, homework and exams. Most important, every step of this initial 1½-year phase of his training program was "*customer oriented*." This means that he was taught to always think first and foremost of customer requirements—*your* needs—whether studying Armco Special Steels, basic steel-making and fabricating methods or sales techniques, public speaking and business correspondence.

But classroom work was only part of the "prep" period. For at least the next year, on-the-job training in an Armco Sales Office as a sales correspondent helped lay a firm groundwork of practical commercial experience.

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Let's Use a Meat Ax On Government Spending!

Business is picking up: So are tax revenues, or they will in the months to come. Once again money will be flowing into government coffers.

It is axiomatic that the more money that comes in the more is spent. That's the way it is with our government. It's even more so. In 23 years out of 25 we spent more than we have taken in.

In our greatest periods of so-called prosperity we have been unable to balance the budget. Or if we have, then it has not been for long. The public debt has gone up and up.

Wage-price spirals have done their part to create inflationary pressures, but government fiscal policies have done more. As long as we can't even begin to keep our national finances in order, we can't beat inflation.

The President and his advisers have asked for common sense in spending. Meetings have been held. People have been preached at. Congressmen have been implored. Voters have been told our future is endangered. Everyone is alerted.

But nothing much has happened. Recently non-defense spending has risen much faster than defense spending. There is room here for a fresh start at common sense.

The defense area appears to be holy. Many people are afraid to attack it because it is defense.

In the defense category are millions upon millions of dollars which probably have less to do with our security than your Aunt Hannah.

The time has come to look at defense spending with a fishy eye. It is time to stop the cloak of sanctity from covering up hare-brained spending for "defense." If the reasons for outlays are compelling—well and good. But when we hear the stockpiling program is billions "off the mark," that's bad.

As for non-defense spending increases—they are indefensible. They will grow as long as "studies" are made to show "services" are needed. They won't be cut or stabilized until all citizens who demand special services mind their fiscal manners.

We have tried everything to cut down government expense. Now there is only one thing left to do.

Let's use a meat ax on the budget!

Tom Campbell

Editor-in-Chief

Information Bulletin

CHEMICAL CONVERSION COATINGS and their functions in facilitating the cold mechanical deformation of metals

By ARTHUR DAHL, Product Development Dept., AMCHEM PRODUCTS, INC.

When used to facilitate the cold mechanical deformation of metals (in drawing, extrusion, stamping, cold heading, necking, and upsetting operations) chemical conversion coatings in conjunction with suitable lubricants perform three important functions. One, they prevent metal-to-metal contact between work and tool. Two, they prevent galling and seizing. Three, they protect stock indefinitely, permitting the storage of in-process work at any stage of production, without danger of corrosion damage.

Characteristic of the tightly bound, highly absorptive, crystalline coating formed by the processes is the ability of the coating to retain lubricity throughout forming operations when treated with a suitable lubricant. This offers the following production advantages:

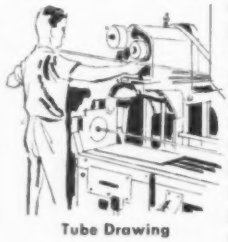
- Higher degree of reduction
- Greater speed of draw
- Longer tool life
- Fewer process anneals and pickling
- Finer surface finish
- Cleaner mills
- Easier inspection of finished product

Also of interest to production men is the exact duplication of coatings from batch to batch. And the processes are much simpler than other methods of coating metals—baths can be set up and running in less time than it takes to determine suitable coatings by other methods.

TYPES OF COATINGS AND THE METALS FOR WHICH THEY ARE DESIGNED

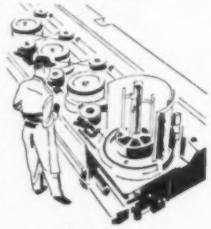
Zinc phosphate coatings for carbon steel. These coatings can be applied by either dip or spray systems.

Dip. Amchem Granodraw No. 1 is typical of the dip process. The sequence includes precleaning, water rinse, pickling, water rinse, water rinse, Granodraw No. 1 solution, water rinse, and a hot neutralizing rinse. Surfaces to be treated must be free of oil, grease, rust and scale. The above sequence insures that they will be. And when metal is free of rust and scale, the pickling bath and two succeeding water rinses can be omitted. In either case, a lubricant like Amchem Granolube or conventional lubricant must be applied prior to working the metal.



Tube Drawing

Spray. Amchem Granodraw No. 4 is an example of the spray process. It usually requires 5-stage equipment and includes the following steps: precleaning, water rinse, Granodraw No. 4 solution, water rinse, lubricant. After chemical treatment, the work must be dried before forming.



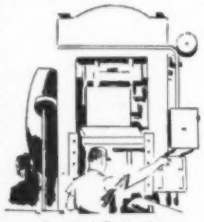
Wire Drawing

Oxalate Coatings for the stainless steels and many of the high-nickel alloys. These coatings are applied only by immersion process, and usually in a 5-stage system which includes an acid pickling or depassivating bath, a water rinse, the Amchem Granodraw SS coating bath, a hot borax neutralizing rinse for wire stock, or a lubricating bath for tube stock. Since thorough activation of the metal surface is necessary to promote an adherent coating, the pickling and activating bath is an important stage in processing.

Fluoride-type coatings for zirconium and its alloys. Granodraw ZR is such a coating. It is applied in an immersion process which includes precleaning, water rinse, pickling, water rinse, Granodraw ZR solution, water rinse, drying or lubricating. It has been used primarily in the treatment of stock prior to wire drawing and tube drawing. Surfaces are cleaned of oil and grease by solvent degreasing or alkali cleaning. Pickling is required to provide a surface that is chemically and metallurgically receptive to the coating.

Cold Heading

Amorphous phosphate coatings for aluminum. This type of coating is now in the development stage. Laboratory and field tests are being conducted, results are being evaluated, and modifications in chemical make-up and process sequence are being made to meet requirements. Several field tests, however, have indicated that it will do the same job for aluminum processors as the other types of coatings have done for those working carbon steel, stainless steel, high-nickel alloy, and zirconium.



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Die-Cast Alloy Takes Heat

A new die-castable material retains good mechanical properties through 800°F. It's being evaluated for aircraft and missile applications. A member of the magnesium group, the alloy contains 1 pct thorium, 1 pct manganese and the balance magnesium. Developer claims it's the first die-castable metal alloy for service above 500°F.

Data on Soldering Aluminum

Research is giving new life to zinc soldering for joining aluminum to itself, copper, steel or other metal parts. The process is said to be corrosion resistant, cheaper and stronger than brazing. It's especially suited to bonding thin complex sections.

Scientific Bottleneck?

Some top Pentagon authorities doubt if advances in missiles and other weapons could be speeded up at more than a moderate rate even if all budget restrictions were removed. Reason: The bottleneck in scientific resources, both manpower and research facilities, is now being stretched to the limit and can only be increased on a long-term basis.

Conveyor Automation Pays

Where conveyor systems cut handling costs, the next step, automatic handling, can pay even more, methods studies show. In the case of one conveyor, mechanized unloading paid for itself in labor reductions in 4 months. It relieved four men from a monotonous heavy job.

Button-Head Welding

A new low-cost method of joining steel is expected to find wide application in the welding of metals from 0.035 to 0.187 in. thick. The finished weld resembles a rivet or button head. In the form of a light-weight gun, it's a welding attachment that turns out fast uniform welds. The method even works through oil and grease.

Watch Hot-Rolled Bar Stock

Despite the often repeated assertion that hot-rolled bar is one of the easier steel items, this is a steel grade to watch. Dangerous shortages are building up in several key areas. One distributor is at half normal stocks. The same holds true for cold finished bar.

Nuclear Shipping at Hand

Buying a steam-powered aircraft carrier is simply buying obsolescence, Vice Adm. Hyman G. Rickover declares. He urges the Congress to add another $120 million to the $260 million already earmarked and order nuclear-powered carrier. Rickover insists nuclear-powered shipping is at hand, and that it's foolish to keep buying outdated equipment.

Beryllium in Space Unit

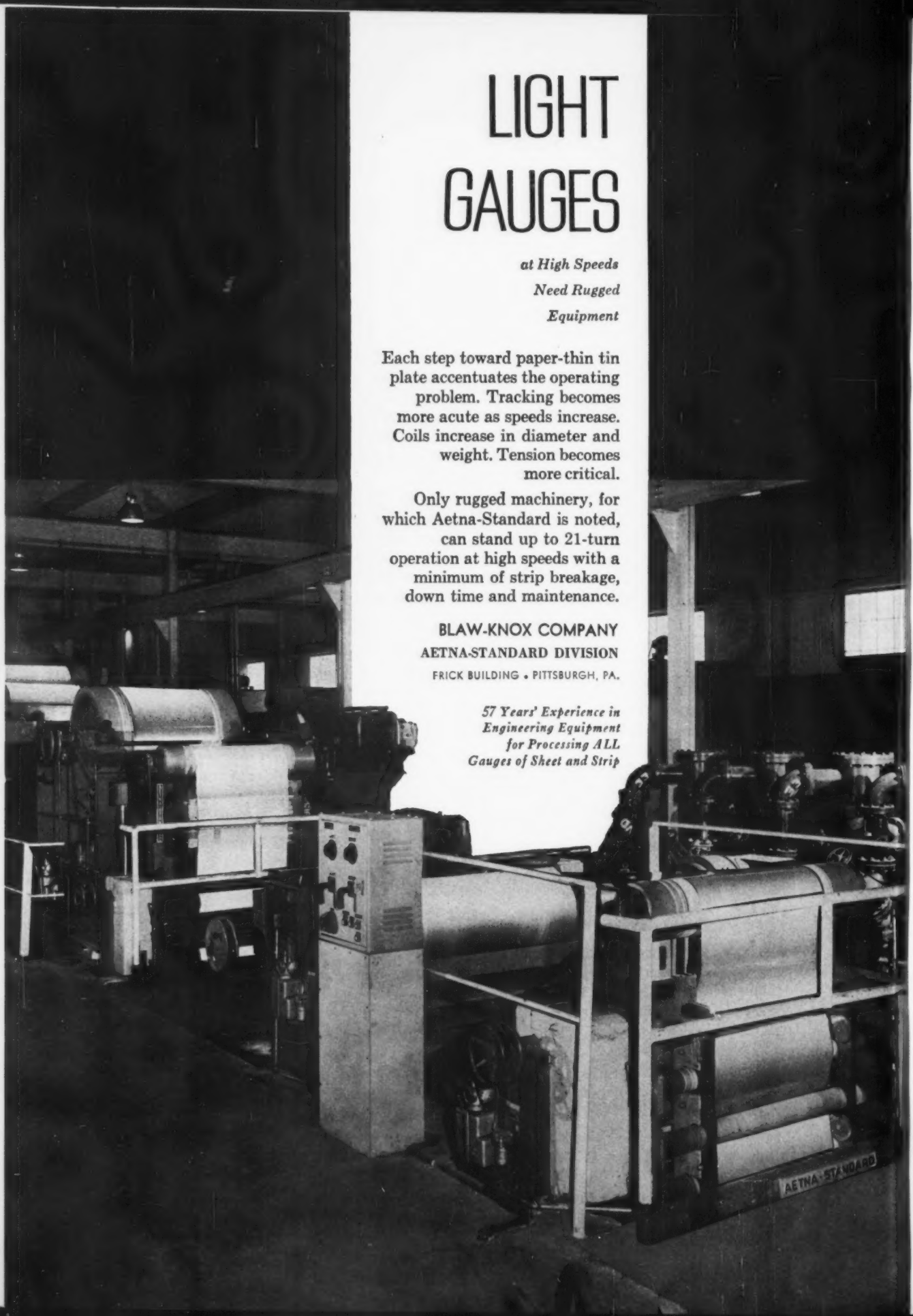
Beryllium is finding use in space vehicles. Soon to be forged is a 9-ft diam dished plate about 6 in. thick to be used in the Project Mercury space capsule. Forging will be done inside a heavy steel sandwich.

Dual-Power Timing Belt

A combination timing belt and V-belt transmits power with both sides of the belt. The positive drive, non-slip unit requires no lubrication. The flexibility of the belt permits pulley diameters as small as ½ in. at 10,000 rpm even at relatively heavy loads.

Columbium in Extruded Bars

Hot extrusion of columbium alloys as ½-in. bar suggests possible new applications in the high-temperature field. Tests indicate 40,000 psi tensile at 2400°F. Until now columbium has been handled only with protective outer coating. One unsolved problem is how to coat the bars.



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Need Rugged
Equipment

Each step toward paper-thin tin plate accentuates the operating problem. Tracking becomes more acute as speeds increase. Coils increase in diameter and weight. Tension becomes more critical.

Only rugged machinery, for which Aetna-Standard is noted, can stand up to 21-turn operation at high speeds with a minimum of strip breakage, down time and maintenance.

BLAW-KNOX COMPANY
AETNA-STANDARD DIVISION
FRICK BUILDING • PITTSBURGH, PA.

57 Years' Experience in Engineering Equipment for Processing ALL Gauges of Sheet and Strip

Design Issue

Sir—Congratulations on your excellent Design Issue of May 14. And many thanks for the outstanding job you did on our design story, "How to Use Modern Materials for Better Product Design," pp. 149-152.

Please rush 500 reprints of this four-page article so I can make a mailing to our sales force.—H. W. Smith, Advt. & Sales Promotion Mgr., Acme Industries, Inc., Jackson, Mich.

▪ Reprints have been mailed. —Ed.

Blough's Ways

In his May 7 editorial ("American Fair Play—What's Happened to It") Tom Campbell took exception to the rough verbal treatment given Roger Blough during his recent Washington testimony.—Ed.

Sir—Congratulations on this splended editorial.

As an officer in charge of naval steel purchases during World War II, I would like to mention a personal experience with U. S. Steel's Roger Blough. The experience proved him to be a man of great patriotism. He put the interests of the Navy (and ultimately the taxpayers) above the interests of U. S. Steel.

Our section negotiated many long-term contracts with the steel industry, including U. S. Steel and its subsidiaries. Under the terms of these contracts, we were given certain cash discount terms.

With wartime purchases, the volume of invoices and necessary procedures precluded meeting discount dates. When we discovered the Navy was losing untold amounts in cash discounts, I consulted our legal adviser. He suggested modifying our contracts if we could get the steel industry to extend our discount terms.

U. S. Steel sent their attorney from Pittsburgh to talk with our lawyer and myself about the problem. When he learned that it was physically impossible to meet the original terms, he asked how much time we needed. We told him. The terms were granted. Contracts were modified and the loss of discounts (taxpayers' money) was stopped. The attorney was Roger Blough.

Again, during the war (when I was stationed in Pittsburgh for the Navy), a very urgent long distance telephone call came through from Washington for steel plate. It was an emergency, battle damage case.

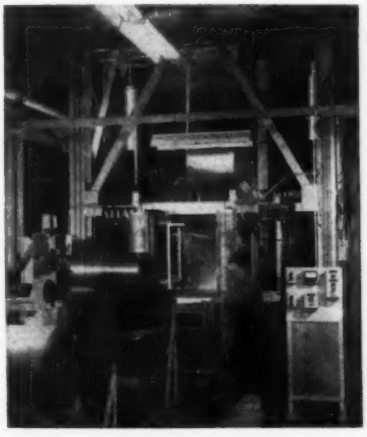
I phoned Dave Jenkins at U. S. Steel, and mentioned this emergency call from Washington. That same afternoon his Homestead plant made the plate available to the Navy.

The Navy ran into trouble with its pallet program (upon which ammunition and other supplies were loaded) during World War II. A shortage developed in the special pallet nails required because of wartime demands. American Steel & Wire Div. of U. S. Steel came to our rescue. Not only did AS&W develop a special nail for us in ample quantities, but they did so at a saving of about 50 pct in price.

In recognition of the outstanding service rendered by AS&W in our hour of need, Admiral W. B. Young sent a most laudatory telegram to Clifford Hood, President of AS&W at that time.

I saluted Roger Blough for his company's great contribution to the Navy during World War II. As a competitor now, I take my hat off to him as he battles to save 175 million stockholders in the U. S. from further ruinous inflation. — W. F. Horsch (CDR.-SC-USNR), William F. Horsch Co., Grosse Pointe, Mich.

To meet demands for perfect finish on stainless and nickel Thinstrip®, Somers installs unique new annealing furnace.



This new Selas vertical continuous annealing furnace assures uncontaminated, commercially unmarred surfaces as well as uniform temper and faster delivery on stainless, nickel and nickel alloy Thinstrip up to 25" wide. But this is only part of the story of Somers' quality. Sendzimir rolling mills, Accu-Ray gauging plus 50 years leadership in thin gauge metals (from .010 down to .000125") are a few of the features Somers offers to assist you with your Thinstrip® problems.

Write for Confidential Data blank — no cost or obligation.

FOR EXACTING STANDARDS ONLY

Somers

Somers Brass Company, Inc.

102 BALDWIN AVE. WATERBURY, CONN.

Now...at no increase in price

40% more HP...longer service life

with Gates Vulco Ropes

Gates brings you, through *Specialized* Research in V-Belts, another important cost-saving advance:

Now — at no increase in price — the horsepower rating of Gates Vulco Ropes has been increased 40%.

As replacements on standard drives, these V-Belts with 40% more load carrying ability will give longer service. Longer life reduces down-time, and cuts belt replacement costs.

And as the tag tells you: Belts labeled "Gates Vulco Rope" or "Gates Hi-Power" are identical in construction and can be used interchangeably in matched sets.

Available Now
from your nearby Gates Distributor

Today, all Vulco Ropes in Gates distributor and warehouse stocks have the new higher horsepower rating.

See the Yellow Pages of your phone book for your nearest Gates V-Belt distributor.

Designing NEW Drives?

For new drives, Gates now offers you the *new Super HC V-Belts and Sheaves* — the most advanced concept in power transmission in 25 years. The Super HC Drive is far more compact . . . takes up to 50% less space. Costs less, too. You save as much as 20% over present V-Belt drives. Ask your nearby Gates distributor for Handbook DH-900 entitled, "The Modern Way to Design V-Belt Drives."

The Gates Rubber Company Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ontario

Gates
World's Largest Maker of V-Belts

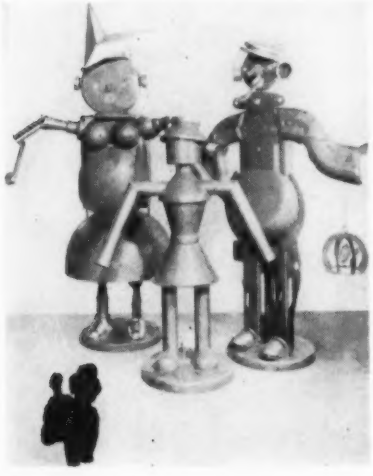
TPA-412

Gates VULCO ROPE Hi-Power V-Belts

Metalman's Family

The family group photographed below was assembled entirely from an assortment of stampings, forgings, formings, and weldments made by the Commercial Shearing & Stamping Co., Youngstown, O.

The company put them together for the recent Design Engineering Show to illustrate the range of



shapes the firm can produce. The half-ton group was all formed from products except the toy dog and bird, the dog's leash, and the birdcage chain.

Some of the parts are actually quite logically chosen. Others are fanciful. The shoes, for example, are really footwear. They are metal toe guards worn in industrial plants and on construction jobs.

Other interesting parts of the sculpture group: The woman's torso is a power mower housing. The man's torso is an operator's platform from a fork lift truck. The child's torso is composed of Rotoformed rocket cones.

The man's face is a water heater tank head, his nose is a forged cutting tool holder, his pipe is a steering king pin forging, his arms are Diesel exhaust elbows, and his legs are stampings and weldments for railway brake mechanisms.

Do Like He Done

Proof that selling and spelling are not necessarily tied together comes in an item reprinted in the American Gear Mfrs. Assn. Digest. The Digest was sharing with readers the following "business letter" story from the Milwaukee Gear Co. News:

A letter, obviously written by an illiterate salesman to the home office, read:

"Dear Boss: I seen this outfit which they ain't never bought a dime's worth of nothing from us and I sole them a couple hundred thousand dollars worth of guds. I am now going to Chawgo."

Two days later a second letter arrived at the home office:

"I cum here and I sole them half a milyon," it said.

Both letters were posted on the bulletin board with this note from the company president:

"We been spendin too much time hear tryin to spel, instead of tryin to sel.

"Let's watch those sails. I want everyboddy should reed these letters from Gooch who is on the rode doin a grate job for us, and you should go out and do like he done."

To which we can only add—he was sew rite.

Excuse Honorable Goof

Two weeks ago we ran an item on this page about C. J. Honen, vice president of the McKay Machine Co., who went on a sales tour of the Far East.

He had a calling card printed which we reproduced saying it was in Chinese. Well it wasn't.

A sharp-eyed reader, D. N. Williams, purchasing agent, the Wallingford Steel Co., writes to the contrary. The card is in Japanese, he says, adding, "as any student of Japanese would know."

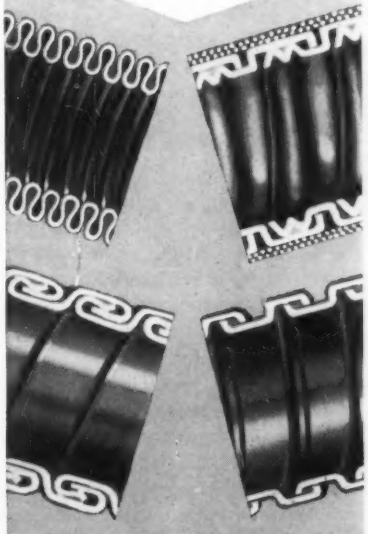
FLEXIBLE TUBING
FOR EVERY APPLICATION
...PRODUCT...PURPOSE

PENFLEX

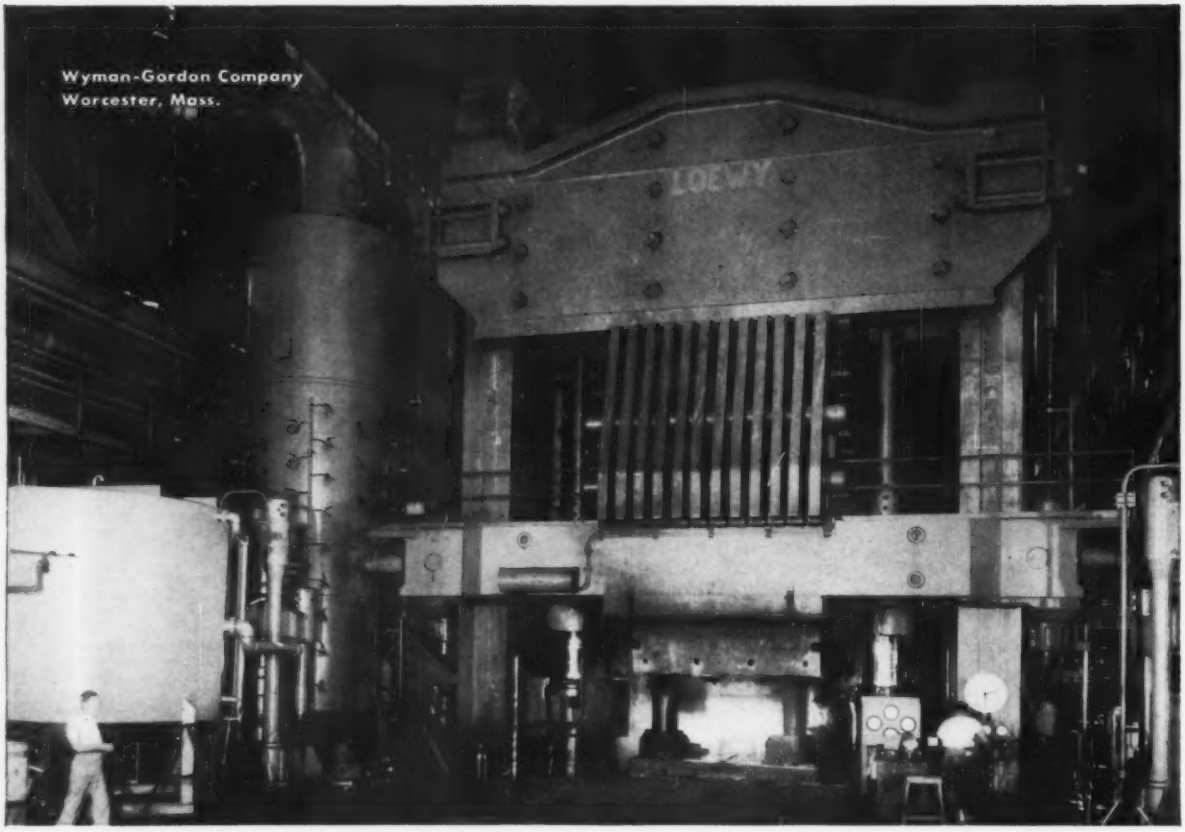
Interlocked, corrugated . . . braided, plain or rubber covered . . . copper, steel, brass or stainless steel . . . from 1/8" to 24" I.D. Penflex makes all types and sizes for all applications and operating conditions.

Penflex Flexible Metallic Tubing is made for rugged, long lasting service. It defies heat, abrasion, crushing . . . will convey everything from semi-solids to the lightest volatile. Get full information. Write . . . Pennsylvania Flexible Metallic Tubing Co., Inc., 7210 Powers Lane, Philadelphia 42, Pa.

NEW DATA BOOK
Get your free copy.



PENFLEX
TIGHT AS A PIPE BUT...
FLEXIBLE



Operation Big Squeeze:

World's largest presses lubricated by Cities Service Pacemaker Hydraulic Oils

Once a forging operation for horse-drawn carriages, Wyman-Gordon Company now operates the world's largest presses, with the newest one capable of exerting 50,000 tons pressure.

Reason for this tremendous press is the increasing need for strong, lightweight metal parts for aircraft. Today, as for many years, no military or transport aircraft takes to the air without Wyman-Gordon forgings.

With its huge, hydraulically operated presses, Wyman-Gordon is able to forge huge pieces with one big squeeze. Sometimes a whole unit for a landing-gear strut. Or one mammoth wing spar.

The press that exerts 50,000 tons pressure is described by Wyman-Gordon as "the largest single machine ever conceived"—and few people would argue the point after seeing it.

Mounted in a pit that extends nine stories beneath the earth, the giant press is over 114 feet high and weighs 10,605 tons, 6,450 of which moves up and down.

Cities Service is justifiably proud that here as in all of Wyman-Gordon's presses with 18,000 tons pressure or better, hydraulic lubrication is provided by Cities Service Pacemaker Oils.

It is hardly necessary to point out the incredible demands that such machinery makes of its hydraulic lubricants... and certainly it is self-evident that if Cities Service Pacemaker Oils can perform satisfactorily in the world's largest presses, they'll do the same for you. Talk with a nearby Cities Service Lubrication Engineer. Or write: Cities Service Oil Co., Sixty Wall Tower, New York 5, N. Y.

Entire Rig Is Operated by One Man with the few simple controls shown here. With a flick of his fingers he can put on a squeeze of 50,000 tons. Result is extremely strong lightweight forgings for aircraft.

Lubrication Foreman has mammoth responsibility. Here, he checks dispenser for Cities Service EP 20 Lubricant... used on main bed and columns of large presses and other areas subject to extreme pressures.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

COMING EXHIBITS

Material Handling Show—June 9-12, Public Auditorium, Cleveland. (Hanson & Shea, Inc., One Gateway Center, Pittsburgh 22.)

Industrial Finishing Show — June 15-19, Detroit Artillery Armory, Detroit. (Information: H. J. McAleer, 3171 Bellevue, Detroit 7, Mich.)

Instrumentation Show — Sept. 21-25, International Amphitheatre, Chicago. (Instrument Society of America, 313 Sixth Ave., Pittsburgh 22.)

Metal Show—Nov. 2-6, International Amphitheatre, Chicago. (American Society for Metals, 7301 Euclid Ave., Cleveland 3.)

MEETINGS

JUNE

Pressed Metal Institute — National sales conference, June 11-12, Bedford Springs Hotel, Bedford, Pa. Institute headquarters, 3673 Lee Rd., Cleveland.

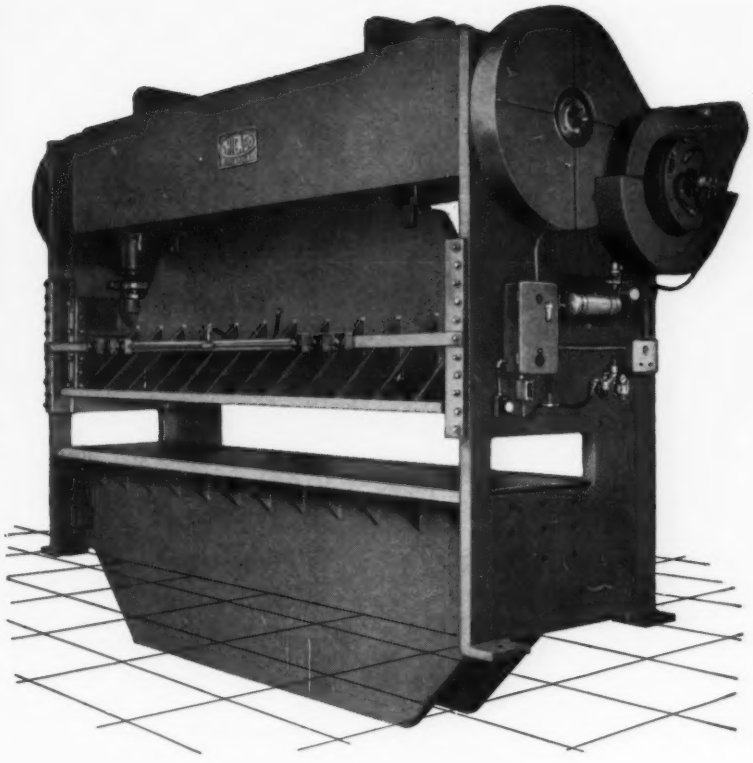
Manufacturing Chemists' Assn.— Annual meeting, June 11-13, The Greenbrier, White Sulphur Springs, W. Va. Association headquarters, 1825 Connecticut Ave., N. W., Washington 9, D. C.

National Assn. of Purchasing Agents—Convention and Inform-A-Show, June 14-17, The Waldorf-Astoria, New York. Association headquarters, 11 Park Place, New York.

The American Boiler Manufacturers Assn. — Annual convention, June 14-17, The Homestead, Hot Springs, Va. Association headquarters, 4062 Mayfield Rd., Cleveland.

The American Society of Mechanical Engineers—Semi-annual meeting, June 14-18, Chase-Park Plaza Hotel, St. Louis, Mo. Society headquarters, 29 W. 39th St., New York.

(Continued on P. 16)



CHICAGO DREIS & KRUMP

PRESSES
STRAIGHT-SIDE TYPE

large die area
capacities up to 400 tons

This is a typical model of CHICAGO straight-side-type presses used for multiple punching, notching, and trimming operations. This press with a die area of 48 inches by 198 inches has a capacity of 200 tons.

Complete recommendations for any job on request.

8674

CHICAGO DREIS & KRUMP

Press Brakes • Straight-Side-Type Presses • Press Brake Dies
Hand and Power Bending Brakes • Special Metal-Forming Machines

DREIS & KRUMP
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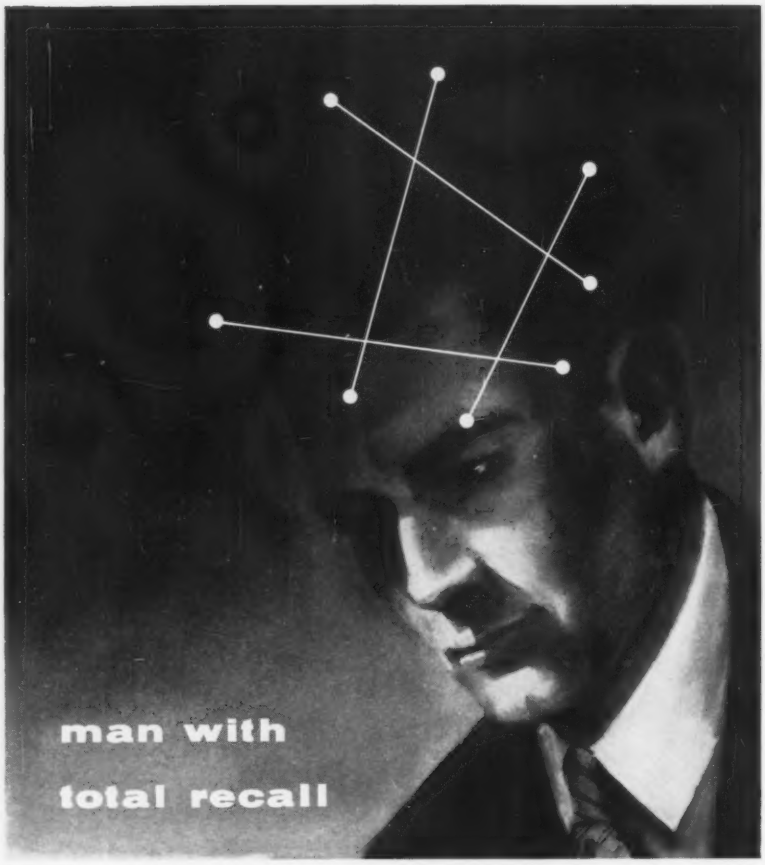
7430 South Loomis Boulevard, Chicago 36, Illinois



When "The Man from Logan" visits you, he brings with him the total engineering recall of the Logan Co. He relates your particular conveyor installation with other custom jobs – he "remembers" systems from times before you and he were born . . . other systems so new they are still on Logan drawing boards hundreds of miles away. Your new conveyor will be the unique, imaginative answer to your special needs but founded squarely on more years of experience – more successful installations – than any other conveyor company can draw upon.

This, then, is what "The Man from Logan" has to offer you. Through him you may draw upon a progressive research and development staff and an eminently qualified home-office engineering force as well.

"The Man from Logan" assumes full responsibility for your job, from design to guaranteed smooth operation. Call him in and be assured of the *one* best conveyor for your needs, at the lowest feasible cost. Write or phone today.

Meet "The Man from Logan" at the MHI Show, Booth 806

Logan Conveyors

LOGAN CO., 545 CABEL ST., LOUISVILLE 6, KY.

EXHIBITS, MEETINGS

(Continued from P. 15)

Association of Iron & Steel Engineers—Western meeting, June 15-17, Hotel Utah, Salt Lake City, Utah. Association headquarters, 1010 Empire Bldg., Pittsburgh.

Alloy Casting Institute — Annual meeting, June 21-23, The Homestead, Hot Springs, Va. Society headquarters, 286 Old Country Rd., Mineola, N. Y.

American Society for Testing Materials—Annual meeting, June 22-26, Chalfonte-Haddon Hall, Atlantic City, N. J. Society headquarters, 1916 Race St., Philadelphia.

Industrial Safety Equipment Assn., Inc.—Annual meeting, June 23-26, Point Clear, Ala. Association headquarters, 420 Lexington Ave., New York.

JULY

Truck Trailer Mfrs. Assn.—Annual summer meeting, July 13-15, The Homestead, Hot Springs, Va. Association headquarters, 710 Albee Bldg., Washington, D. C.

Metal Lath Mfrs. Assn.—Meeting, July 21-22, Statler Hotel, Buffalo, N. Y. Association headquarters, Engineers Bldg., Cleveland.

Assn. of Roller & Silent Chain Mfrs.—Summer meeting, July 22-23, Grand Hotel, Mackinac Island, Mich. Association headquarters, 3343 Central Ave., Indianapolis.

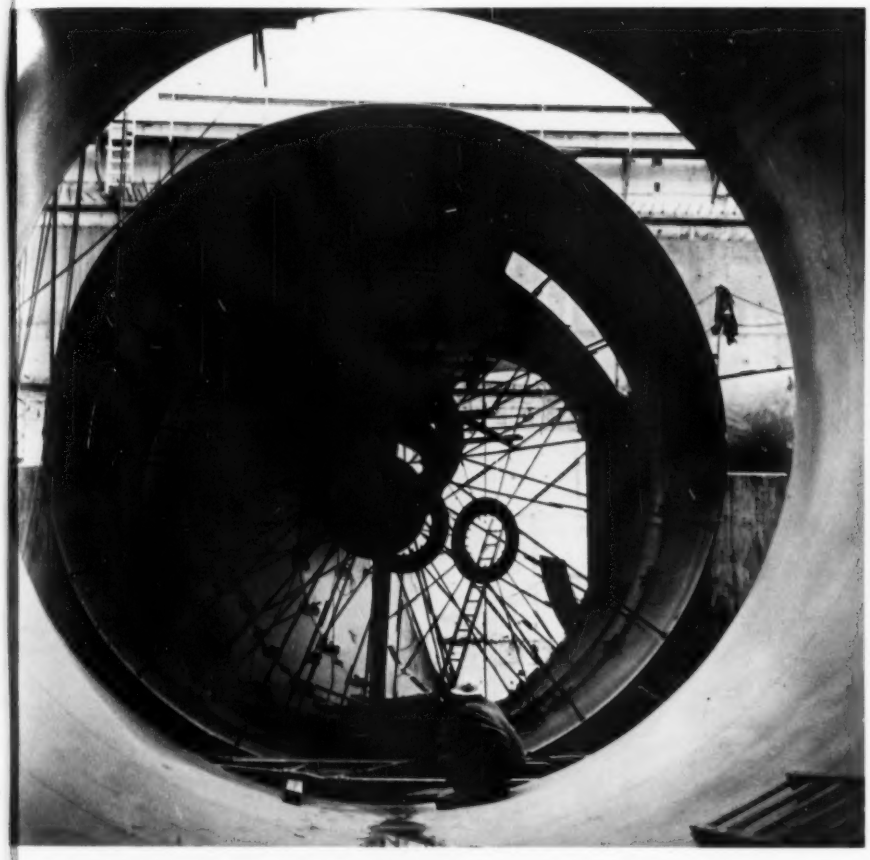
SEPTEMBER

Pressed Metal Institute — Annual meeting, Sept. 13-17, Estes Park, Colorado. Institute headquarters, 3673 Lee Rd., Cleveland.

American Mining Congress—Metal mining-industrial minerals convention, Sept. 14-17, Denver, Colorado. Congress headquarters, 1200 18th St., N. W., Washington, D. C.

American Die Casting Institute—Annual meeting, Sept. 15-18, Edgewater Beach Hotel, Chicago. Institute headquarters, 366 Madison Ave., New York.

Owner: The Washington Water Power Company • Engineering: Ebasco Services, Inc.
Scroll cases: Chicago Bridge & Iron Co. • General contractor: Morrison-Knudsen Co. • Turbines: Allis-Chalmers Co.



Good fabrication and welding properties of "T-1" Steel saved time and money in the shop and on location.

◀ **24 feet in diameter**--among the nation's largest turbine scroll cases. Built with USS "T-1" Steel for maximum strength with least weight.

Big turbine scroll cases built 50% lighter with USS "T-1" Steel

A turbine scroll case looks like a giant seashell. Through the conch, water gushes in an ever-tightening spiral into the blades of the water turbine. Pressures are enormous.

Four of these cases, among the largest in the United States, have been fabricated from USS "T-1" Constructional Alloy Steel by the Chicago Bridge & Iron Company. They will harness the flow of the Clark Fork River in the Noxon Rapids Dam, a project of the Washington Water Power Company.

USS "T-1" Steel was used for the cases because of its high minimum yield strength of 90,000 psi. (100,000 psi for non-code applications.) This permitted a reduction in plate thickness of about 50% with sizeable savings in welding costs, freight and foundation costs. Welding on the job was readily done and there was no need for stress relieving.

What USS "T-1" Steel can do for you.

USS "T-1" Steel is an extra strong, tough, weldable steel with high resistance to impact abrasion and corrosion. Both mobile and stationary equipment can be built bigger, stronger and more durable. Payloads can be increased and operating costs drastically reduced. Your products are worth more because they do more and save more when built of USS "T-1" Steel. For information about USS "T-1" Steel, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS and "T-1" are registered trademarks

United States Steel Corporation – Pittsburgh
Columbia-Geneva Steel – San Francisco
Tennessee Coal & Iron – Fairfield, Alabama
United States Steel Supply – Steel Service Centers
United States Steel Export Company

United States Steel

USS

Down go back-up roll costs with

th

USS Quality Forged Sleeves

PICTURED ABOVE is James S. Rennick, a metallurgist with twenty years' experience in the Forgings Division of U. S. Steel. Jim specifies composition, heat treatment, and other processing procedures essential to the production of assemblies as shown in the main picture—a back-up roll that will be used in the cold reduction tin mill at U. S. Steel's Gary, Indiana plant.

This job points up a curious situation: U. S. Steel is one of the country's leading manufacturers of rolls, and also one of the biggest *users* of rolls . . . a double reason to perfect their performance and reduce their cost . . . just as we did here.

We had to replace a worn, cast steel back-up roll. Rather than replace the entire roll, we machined the face of the roll and shrunk on a *forged* steel sleeve. For back-up rolls like this one, 42″ O.D. and larger, this method of sleeving is much less expensive than buying a complete new roll. One arbor can be used for several forged sleeves. A forged sleeve has a hard, wear-resistant surface and is highly resistant to spalling.

Also, the sleeve is purposely produced with a softer bore to develop a desirable stress pattern, and to provide maximum gripping between the arbor and sleeve after assembly.

There is a good possibility that we can help reduce *your* roll costs. Write or call the United States Steel Office nearest you, or United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

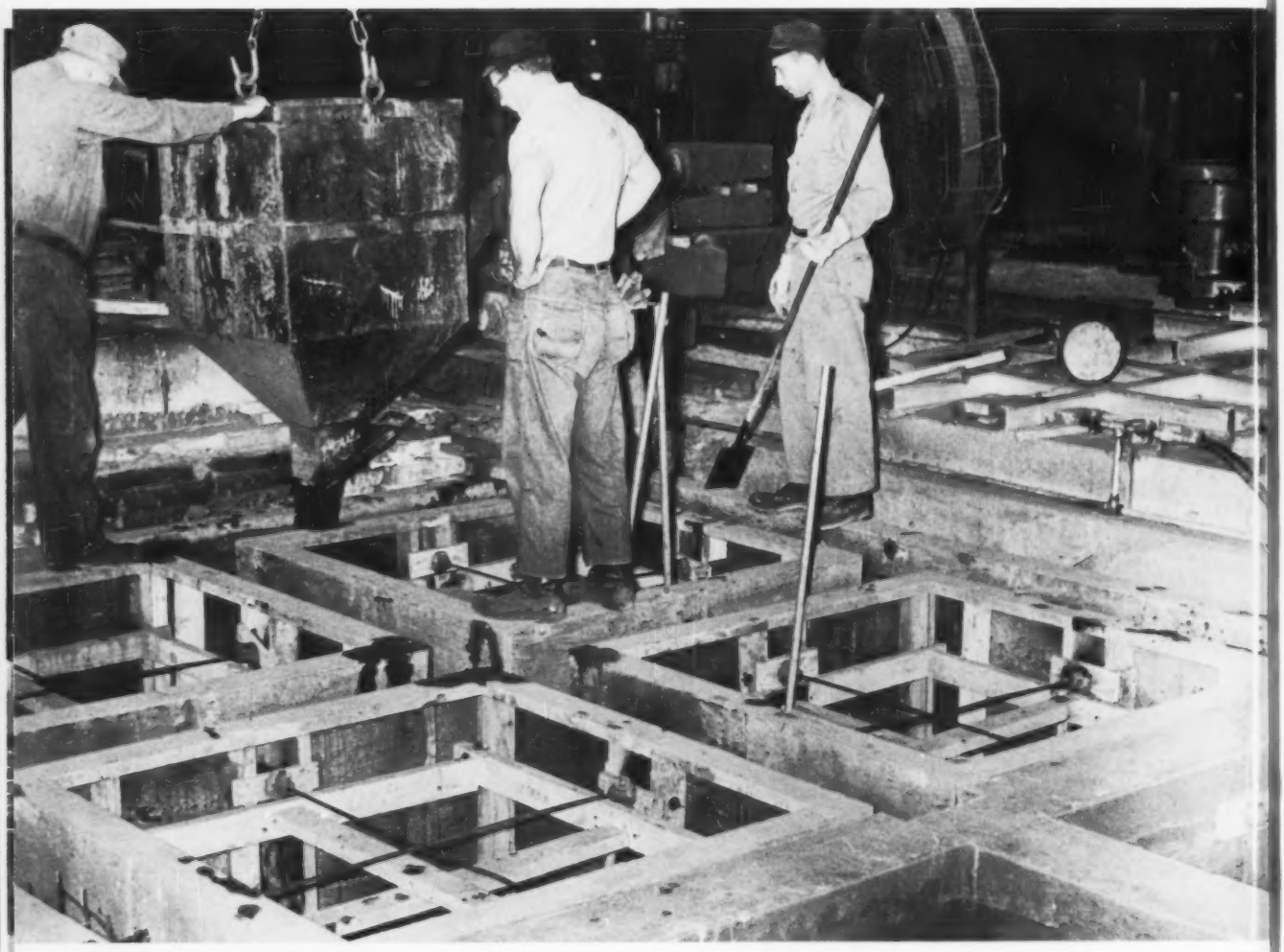
USS is a registered trademark

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Export Company

United States Steel

USS

Slow-cooling pits cost less to build with refractory concrete made with Atlas Lumnite Cement



Vanadium-Alloys Steel Company, Latrobe, Pennsylvania, saved time and money by constructing slow-cooling pits with refractory concrete made with Lumnite calcium-aluminate cement. Using plant labor, 24 refractory concrete pits were formed in record time. With re-usable wood forms, material costs were greatly reduced. And procedures and equipment typical of any standard concrete construction work helped speed the job. The result was a smooth, jointless concrete pit that will resist thermal shock and wear and tear of charging and unloading hot alloy ingots.

For added convenience and economy in refractory concrete construction, castables made with Lumnite cement are available. These are packaged mixtures, ready for use. Simply add water, mix and place. Made by leading manufacturers of refractories. For more information, write Universal Atlas, 100 Park Avenue, New York 17, N. Y.

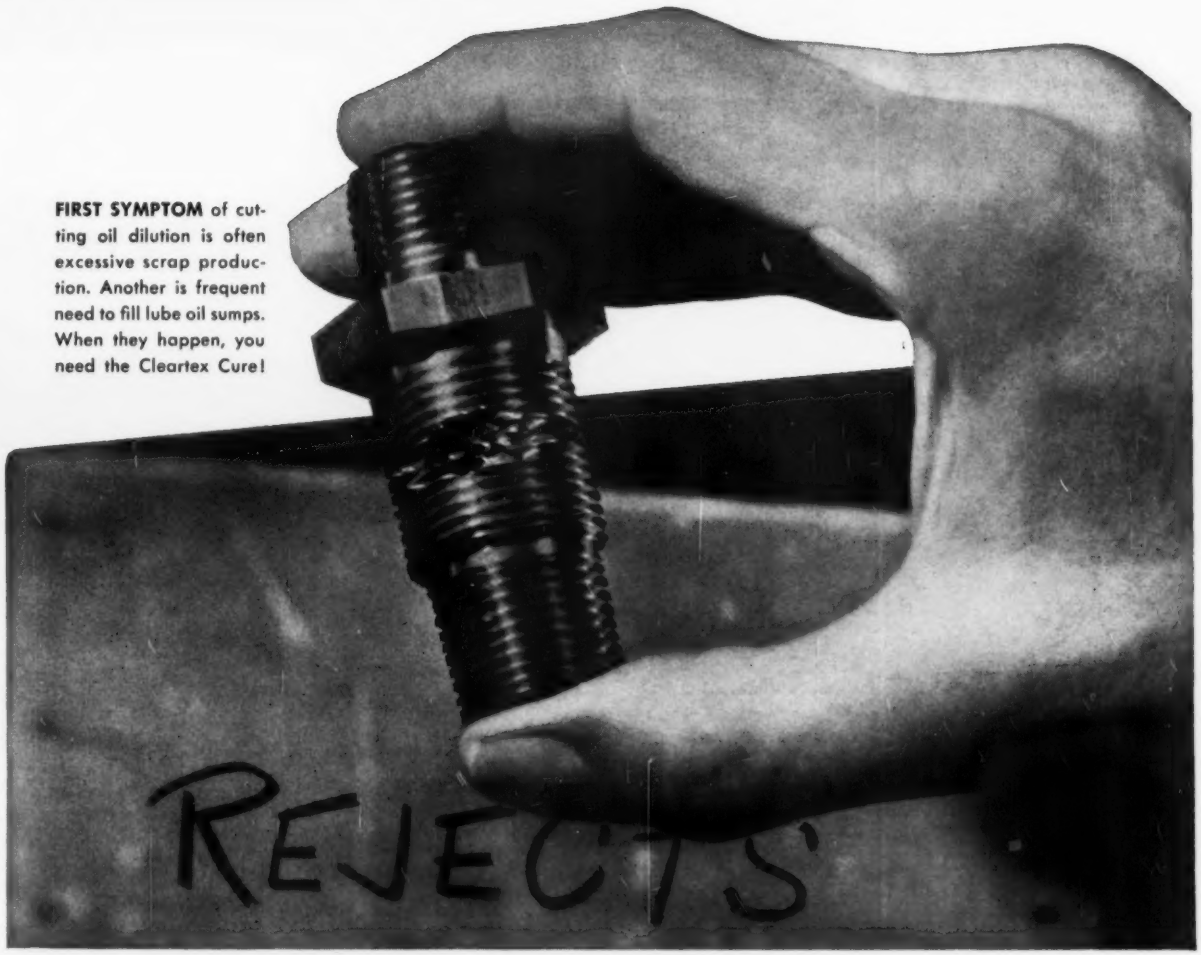
"USS," "Atlas" and "Lumnite" are registered trademarks

L-180

USS

Universal Atlas Cement
Division of
United States Steel

OFFICES: Albany · Birmingham · Boston · Chicago · Dayton · Kansas City · Milwaukee · Minneapolis · New York · Philadelphia · Pittsburgh · St. Louis · Waco



FIRST SYMPTOM of cutting oil dilution is often excessive scrap production. Another is frequent need to fill lube oil sumps. When they happen, you need the Cleartex Cure!

Diluted cutting oil can pile up rejects

When you find your scrap production soaring, the villain may be lube oil leaking into the cutting oil sumps of your automatic screw machines. It happens in 7 out of 10 automatics in spite of the most careful lubricating techniques. This dilution will lower cutting oil effectiveness—and, as it loses its efficiency, rejects pile up, tool life drops, and production can go down by as much as 33 per cent!

Texaco Cleartex can solve the problem—forever!
Because of its exceptional stability and load-carrying ability, Cleartex can function *both* as a cutting oil *and* as a lubricant —and even as a hydraulic fluid. When *all* your automatics' sumps are filled with Cleartex, unavoidable leakage is no longer a problem. Excessive scrap production will stop, tools will last longer and production will go up.

TAKE THE "CLEARTEX CURE" SOON!
Write today for your copy of Texaco's new booklet—"Cleartex in Automatic Screw Machines." This new illustrated guide will fill you in on the details, show you where you may be losing profits and how to avoid it. Or contact your local Texaco Lubrication Engineer for an authoritative survey of your automatics. Just call the nearest of the more than 2,000 Texaco Distributing Plants, or write:
Texaco Inc., 135 East 42nd Street, New York 17, N. Y., Dept. IA-FM-31.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL
(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

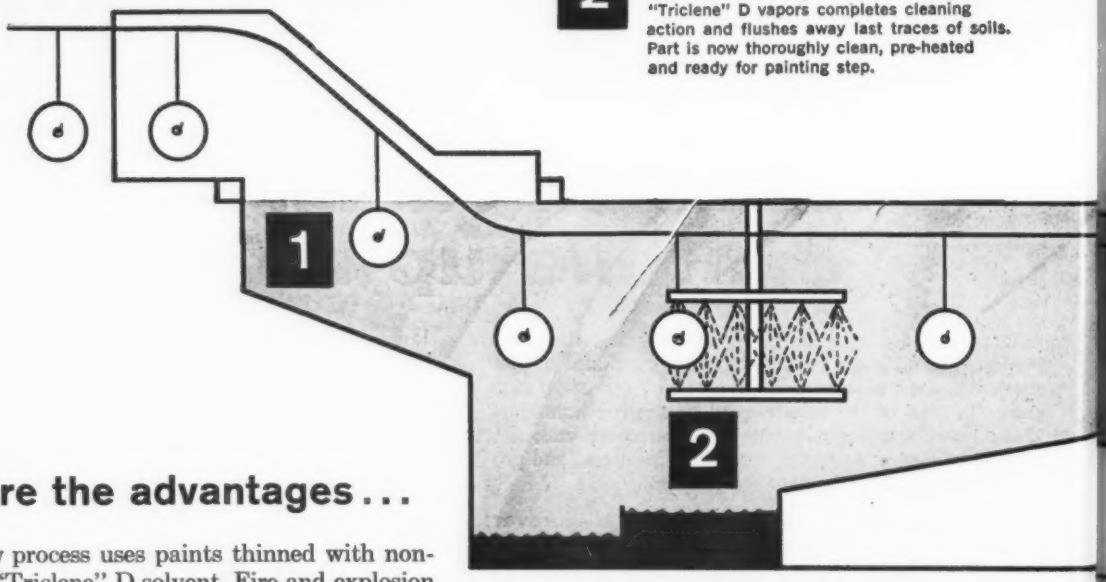
A new process from Du Pont...

Vapor degreasing and in one compact unit—with

HOW IT WORKS

1 Greasy and soiled pulley wheel (above) enters degreasing section of unit (No. 1 below) after prior fabricating steps. Cleaning action begins as "Triclene" D trichlorethylene vapors condense on cold part.

2 Mechanical action of spray rinse (No. 2 below) accelerates cleaning. A final rinse in pure "Triclene" D vapors completes cleaning action and flushes away last traces of soils. Part is now thoroughly clean, pre-heated and ready for painting step.



Here are the advantages...

SAFE: New process uses paints thinned with non-flammable "Triclene" D solvent. Fire and explosion hazard virtually eliminated!

CUTS COSTS: Solvent, overspray and excess paint are fully recovered—drip loss is eliminated. Integrated cleaning and painting with "Triclene" D trichlorethylene cuts labor and utility costs.

ONE COMPACT UNIT: Simplified equipment saves floor space and reduces finishing time. Unit can be easily adapted to fit in with other production steps both before and after cleaning/painting.

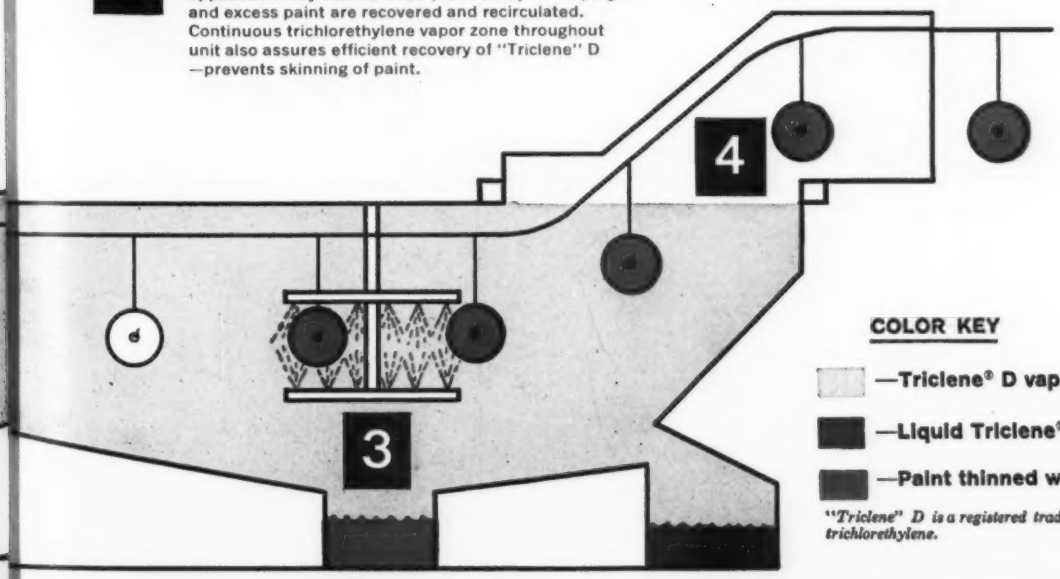
LOW INVESTMENT: No drip pans or spray booths needed. Drying ovens can be eliminated or requirements minimized.

CHOICE OF FLOW COATING OR DIPPING: "Flow-on" application of paints (illustrated) or a "hot-dip" method is available. Du Pont Technical Representatives can help you fit integrated cleaning and painting to your operation.

nonflammable painting Triclene® D trichlorethylene

4 When lacquer type paints are used, parts emerge from unit (No. 4 below) completely dry and ready for final assembly or packaging. Where curing paints are used, baking can be attained with minimum time and equipment requirements.

3 Non-flammable paint thinned with "Triclene" D is "flowed" on the part (No. 3 below) . . . "hot-dip" application may also be used (not shown). Overspray and excess paint are recovered and recirculated. Continuous trichlorethylene vapor zone throughout unit also assures efficient recovery of "Triclene" D —prevents skinning of paint.



COLOR KEY

—Triclene® D vapor zone

—Liquid Triclene® D

—Paint thinned with Triclene® D

"Triclene" D is a registered trademark for Du Pont trichlorethylene.

Technical Report available . . .

Du Pont has prepared a Technical Report describing its new process for integrated cleaning and painting. Included are cost comparisons to help you determine probable cost savings. Get a copy of this Report from your Du Pont representative or your distributor of "Triclene" D trichlorethylene. You can also write to Du Pont, Electrochemicals Dept., Wilmington, Del.

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

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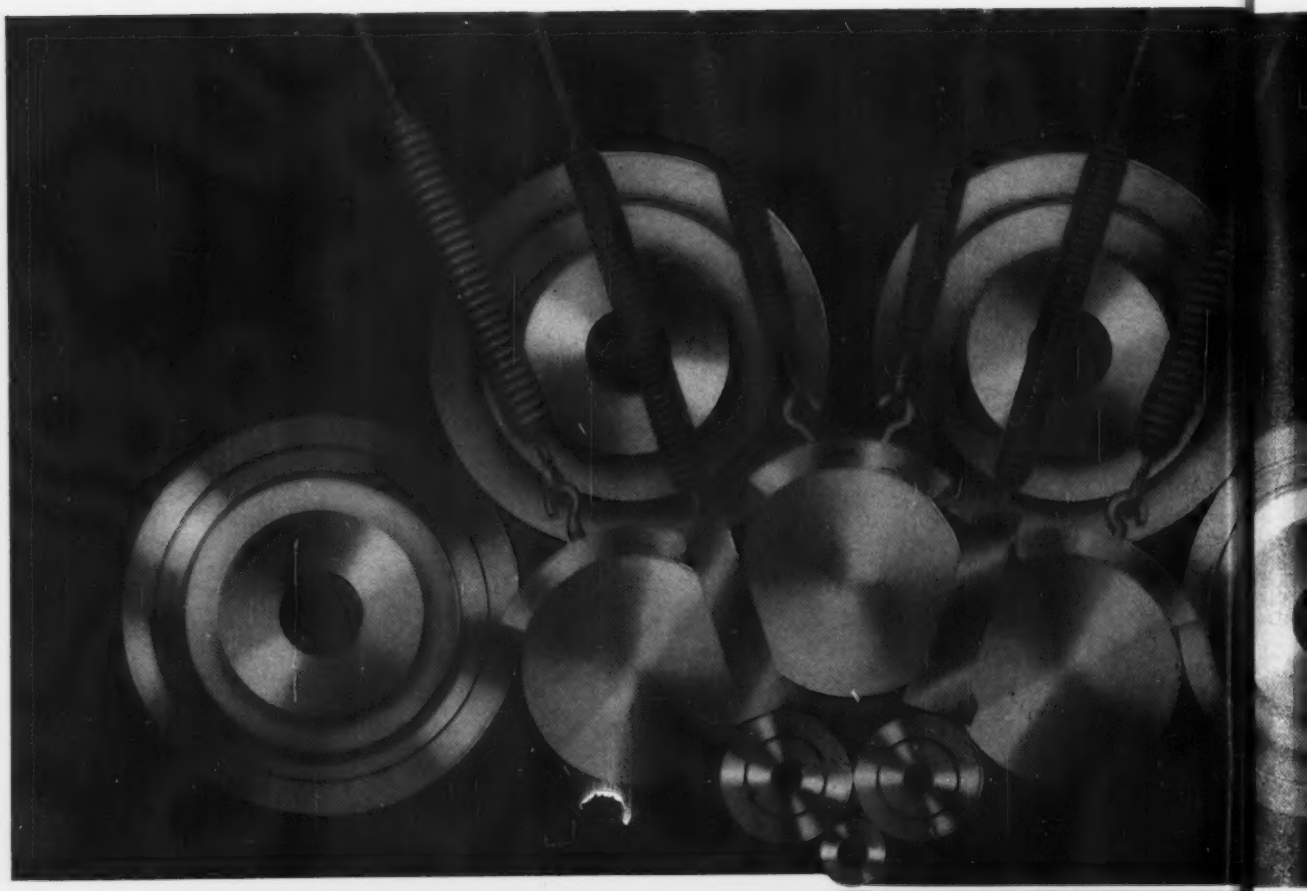
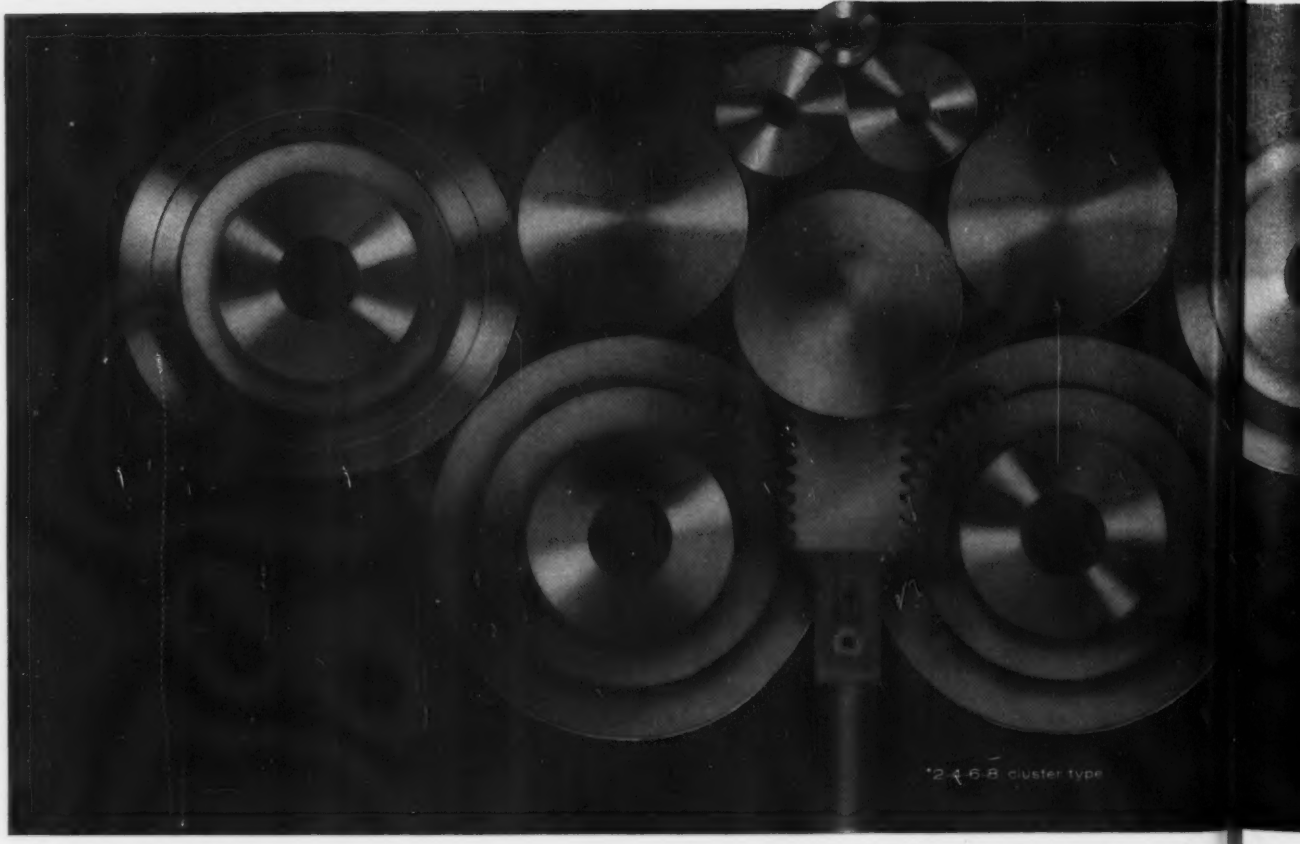
Export Division, Du Pont Building, Wilmington 98, Delaware



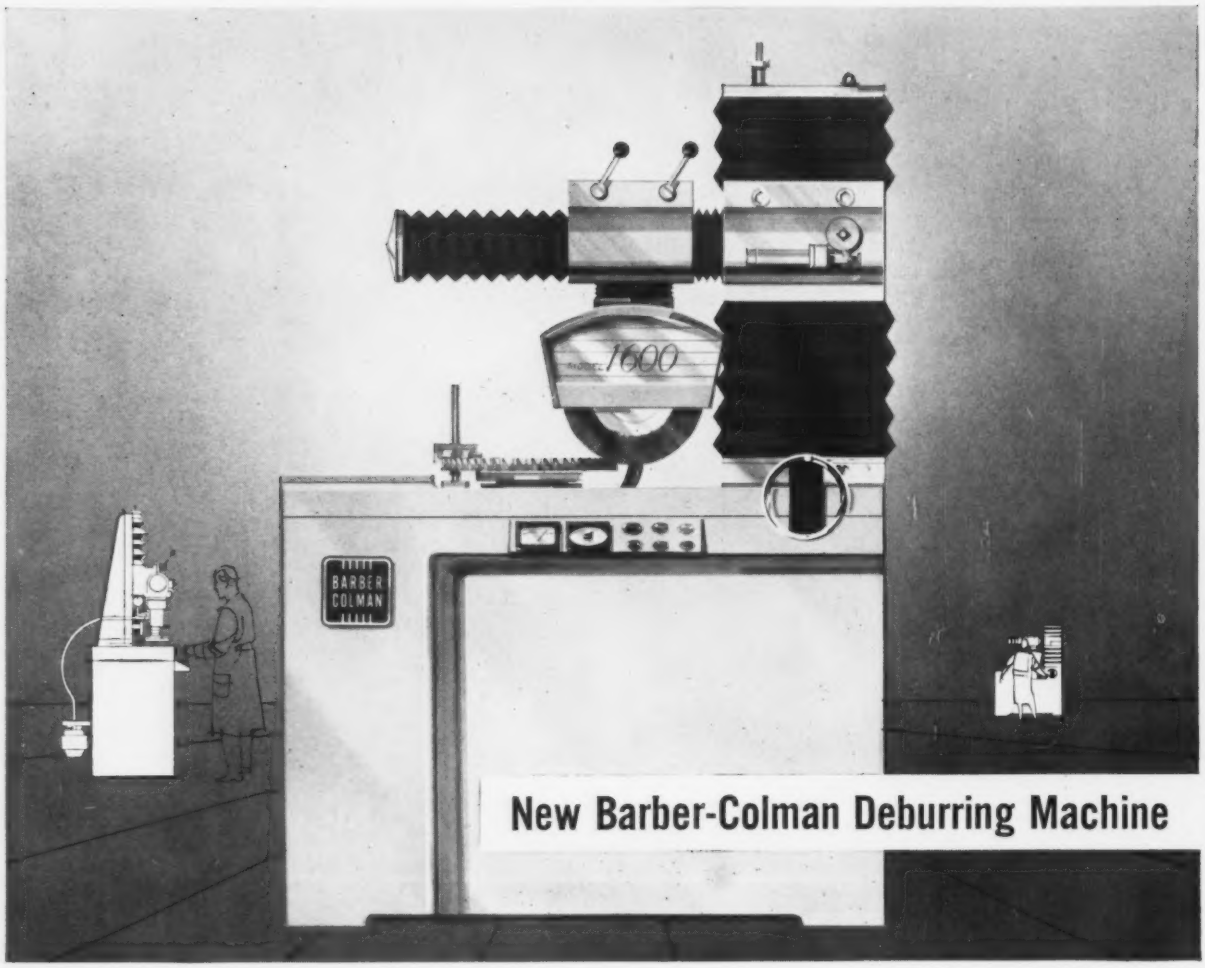

*2-4-6-8 cluster type

PINPOINTED POWER

In Eastern's celebrated "Z" mill," photo-diagrammed here, two highly finished, small-diameter work rolls pinpoint the combined power of eighteen progressively larger back-up rolls and bearings . . . to produce light gauge stainless steel sheets, coils and strip. This Sendzimir method of precision cold rolling achieves the deepest "bite" per pass . . . close-tolerance gauges down to .007" . . . widths up to 48" . . . a surface of uniformly superior quality.

Two years of "Z" Mill experience add to the assurance that Sendzimir-produced Eastern stainless steel will meet your specifications . . . accurately and always.

EASTERN
STAINLESS STEEL
BALTIMORE 3, MARYLAND, U. S. A.



New Barber-Colman Deburring Machine

Fast, Efficient Gear Deburring

Deburring of spur and helical gears and sprockets is now fast, easy, and accurately controlled using a 3M "PG" wheel on the Barber-Colman Deburring Machine. This new method, developed by 3M Company and Barber-Colman Company, does not leave a burr on either the tooth profiles or the face of the gear. Also, it can grind a small chamfer on the complete tooth profile when required. Gears up to 16" diameter can be deburred on the Model 1600 machine. For fine-pitch gears, a smaller machine using a 6" PG wheel will be available. The same process also can be applied to deburring of gears larger than 16" diameter.

This versatile machine is designed specifically for the deburring of gears and other toothed forms using the "PG" wheel. It is automatic cycling, and most gears can be deburred in a matter of a few seconds. The formed wheel, which is dressed easily on the machine, rotates in timed relationship with the work. After the first dressing, wheels require no further maintenance. The wheel is fed automatically into the work a predetermined amount during each cycle and is engaged with the work for a predetermined length of time. After the initial setup, the operator just loads and unloads the machine.

For further information, contact your nearest Barber-Colman representative or the factory. We will be glad to arrange a demonstration showing how this machine will deburr your parts.

Barber-Colman Company

BARBER COLMAN

610 Loomis Street, Rockford, Illinois

3M "PG" Wheels Cut Gear Deburring Costs up to 75% with New Barber-Colman Deburrer

Spur or helical gears and sprockets can be deburred automatically, rapidly and economically by this new Coated Abrasive method. Developed through joint effort between Barber-Colman Company and 3M Company, this method eliminates the costly hand operations—filing, grinding, wire-brushing—and expensively slow machine operations previously required for precision deburring.

The heart of the method is the versatile 3M "PG" Wheel. As shown, the abrasive leaves of the "PG" Wheel conform to the *exact* shape required to deburr either spur or helical gears. On-the-line tests of this 3M—Barber-Colman team have shown unit cost reductions of 75% and more on a variety of gears.

Write us today for complete information on this new method and machine and for 3M technical assistance on any grinding and finishing operation in your plant. See how the right abrasive can cut your costs and widen your profit margin. Address your request to 3M Company, Department DD-69. St. Paul 6, Minnesota. No obligation, of course.

"PG" Wheels are manufactured in U.S.A by 3M Company, St. Paul 6, Minn. Export: 99 Park Avenue, New York. Canada: London, Ontario

WE RECOMMEND
How to use coated abrasives to cut costs . . . improve production, shown in the new 426-page book
COATED ABRASIVES
MODERN TOOL OF INDUSTRY
At bookstores or McGraw-Hill, N. Y.

3M Coated Abrasives

"PG" WHEELS

MINNESOTA MINING AND MANUFACTURING COMPANY

. . . WHERE RESEARCH IS THE KEY TO TOMORROW

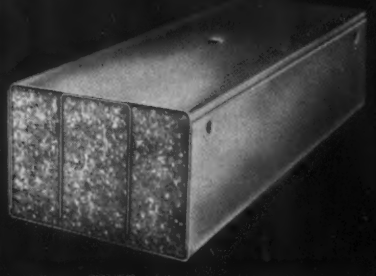
3M COMPANY

From Harbison-Walker Research came
METALKASE 29-57 XXP
a great contribution to the
ALL-BASIC OPEN HEARTH FURNACE

One of the earliest and perhaps the most important contribution of Harbison-Walker Research to open hearth practice was the introduction in 1916 of METALKASE, the first metal-encased basic refractory brick. This new product opened the way to many advances in steelmaking and millions have been used over the years for side walls, end walls and bulkheads.

Accelerated progress, involving larger furnaces, increased use of oxygen and higher production rates, has intensified the severity of service conditions, especially in the roof. METALKASE 29-57 XXP—the newest refinement of Metalkase—is establishing unmatched records in this exacting service.

Harbison-Walker Research continues its vigorous program dedicated to the development of better, more serviceable refractory products for all industry. With a rich heritage of accomplishment, and the industry's most modern and most complete research facilities, Harbison-Walker Research looks forward to even greater achievements in the years ahead.

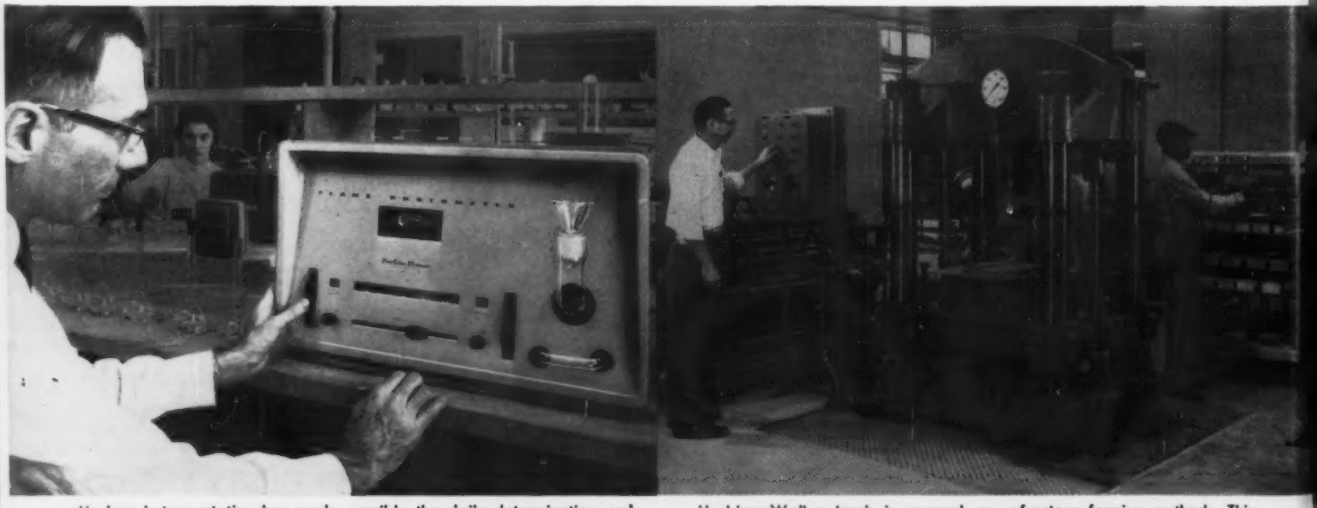


Metalkase 29-57 XXP is an internally-plated, metal-encased basic brick, developed especially for service in the basic open hearth roof. Its performance has been unexcelled.

Harbison-Walker Refractories Company

AND SUBSIDIARIES — General Offices: PITTSBURGH 22, PA.

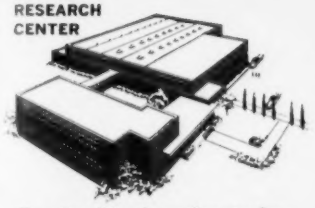
World's Most Complete Refractories Service



Modern instrumentation has made possible the daily determination and study of refractory elements formerly neglected as unimportant. These studies have led to significant developments in refractories.

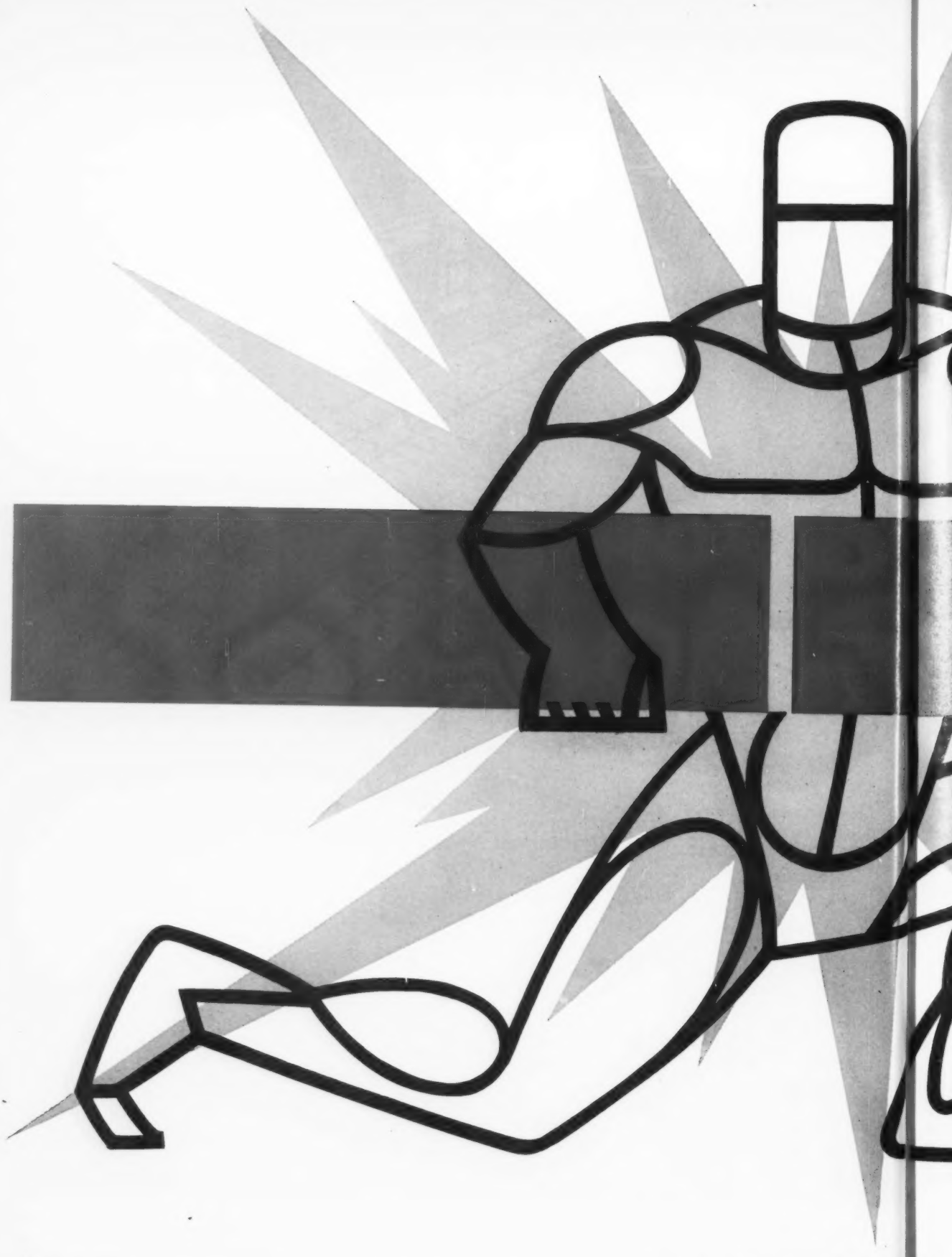
Harbison-Walker leads in research on refractory forming methods. This highly instrumented 300-ton press at the Garber Research Center is used to investigate the effect of variations of pressure, speed of forming and other factors.

GARBER
RESEARCH
CENTER



Leadership in refractories through constant research

Refractories science is based on studies of minerals whose characteristics and very presence may lead to recommendations which will allow progress to be made in industrial processes. Problems in the steel industry often yield to studies of this nature.



COMBINES SUPERB WELDABILITY WITH EXTRA STRENGTH

N-A-XTRA

BEST LOW-ALLOY EXTRA-STRENGTH STEEL YOU CAN BUY

When only the strongest steels will do, specify N-A-XTRA HIGH-STRENGTH. This low-alloy heat-treated steel is now available in minimum yield strengths ranging from 80,000-110,000 psi.

Along with this great strength, N-A-XTRA is readily formed and fabricated. It can be welded by any process. The most drastic welding tests on N-A-XTRA have shown no underbead cracking, even when plate temperatures are as low as —60°F.

Because N-A-XTRA is nearly three times stronger than mild carbon steels, it gives designers an opportunity to eliminate useless dead weight from finished products and realize substantial savings. Let us show you how N-A-XTRA HIGH-STRENGTH steel can do a job for you. Write Great Lakes Steel Corporation, Detroit 29, Michigan, Dept. A-7.

GREAT LAKES STEEL

A DIVISION OF NATIONAL STEEL CORPORATION

Important new discovery for users of resinoid-bonded diamond wheels

YOU CAN DEPEND

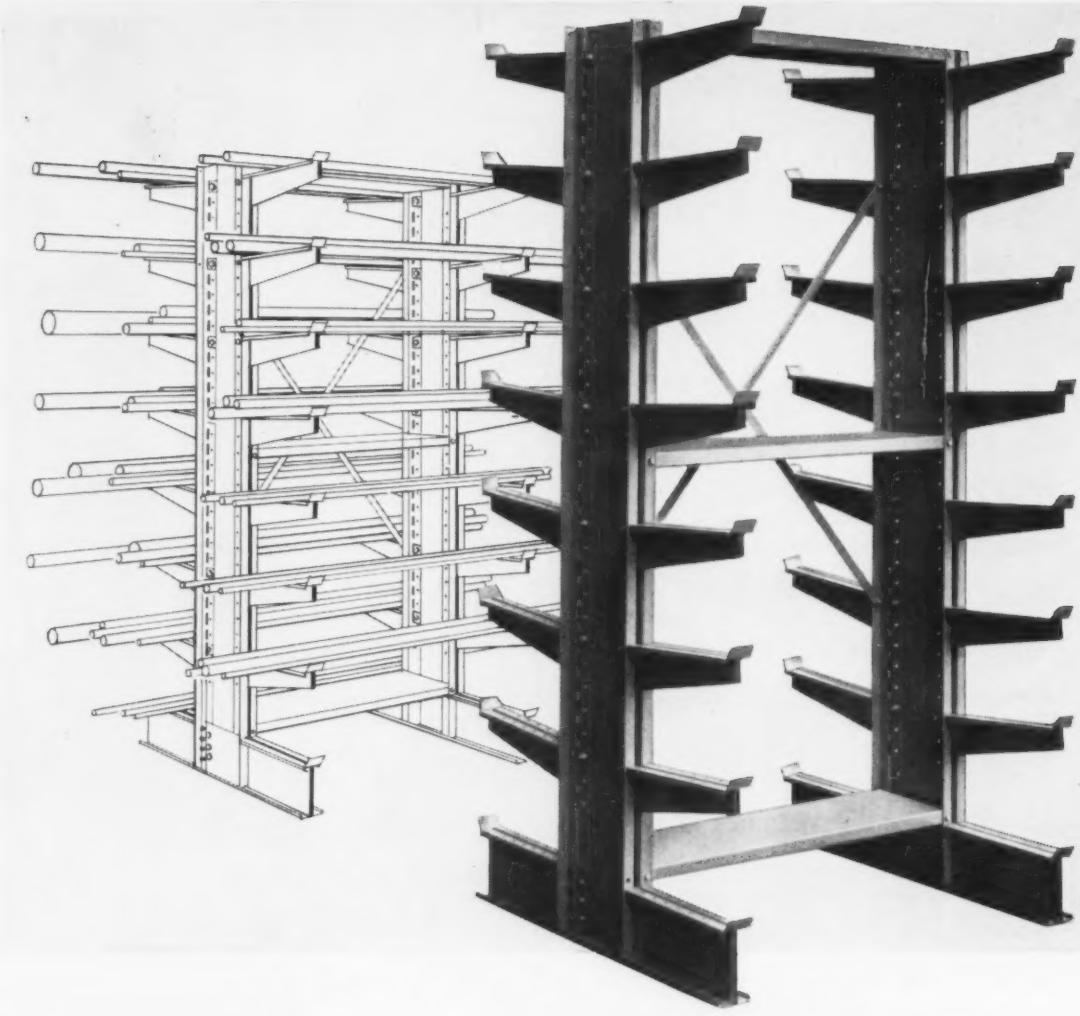
The Diamond Research Laboratory has just completed one of the most exhaustive research projects ever conducted in the diamond abrasives field. A total of 700 pounds of hardest carbide was ground. Over an eight-month period, 600 separate tests were run with 145 resinoid wheels. These tests were made to evaluate a completely new type of natural diamond grit.

The results are impressive: from 30% to 50% longer wheel life than was possible with the old natural grit. Why the spread? Because there's no such thing as an average job, so you can't strike an average figure. But whatever the job, this new natural grit is a vast improvement.

Selected Natural Diamond (SND-RESINOID) was researched especially for users of resinoid-bonded wheels. This grit will be available to your wheel manufacturer. Next time you order a resinoid wheel, specify SND-RESINOID. He'll know what you mean.

ON NATURAL DIAMONDS

INDUSTRIAL DISTRIBUTORS (SALES), LTD.



STACK and STORE 14 Tons

IN 36-INCH SPACE...WITH NEW REPUBLIC BAR RACK

This new, all new, double-faced, double duty Republic Steel Bar Rack stacks and stores 14 tons of bar type stock in 36 inches of floor space!

Here is the ideal solution to a practical, economical way to stack and store bars, pipes, rods, any elongated stock. And you can load and unload this new Republic Bar Rack from either side.

Strong and sturdy—made of steel. Engineered and designed for shop convenience. Arm arrangement permits easy access and stock segregation. Arms are adjustable on 2-inch centers. Each arm supports a full ton of bar or pipe type material.

Compact, too. Republic's Bar Rack Double-Face Starting Unit is 78″ high, 36″ wide, and 33″ deep at the base. Each unit consists of two uprights, three divider pans, and two cross braces. Available in either Olive Green or Gray baked-on enamel finish.

Republic's Berger Division is the leading manufacturer of all types of industrial racks and shelving, shop desks and work benches, materials handling equipment, and other specialty shop equipment.

If you have a shop storage or materials handling problem, call your Republic-Berger representative. Republic specialists will help you plan a practical, economical solution. Call, or write direct today.

REPUBLIC STEEL LOCKERS provide clean, attractive, dress-wash-and-change facilities. Big and roomy, interiors are spacious and well designed for convenience and good ventilation. Strong and sturdy, made of steel to assure complete protection of personal effects and tools. Bonderized, an exclusive feature that provides a superior base for the baked enamel finish. Restricts bumps, scratches, abrasions of everyday service to the site of the injury. Available in a wide selection of sizes, styles, and popular locking devices. Write today.

REPUBLIC'S BERGER DIVISION CONTRACT FACILITIES can help you solve fabricating and assembly problems. Berger will manufacture your product in volume runs—engineer, fabricate, finish, pack, and ship, all to your specifications. Your contract-fabricated products can be completely assembled with operating mechanisms installed. Sheet metal assemblies can be finished with a prime coat, ready for final finishing, assembly and packing at your plant. Write today. A Republic representative will review Berger's facilities with you.

STACK...STORE...SHIP...WITH REPUBLIC MATERIALS HANDLING EQUIPMENT. These strong, steel, rugged skid boxes deliver long, efficient service at low per-year cost. They feature corrugated box construction and heavy-duty stacking brackets for easy handling. Four-way space fork channels simplify handling in close-quarter restricted space. Stacking does not damage the boxes and stacking speeds materials handling. Let Republic's Berger Division Materials Handling Specialists solve your materials handling problems. Send coupon.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
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1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send information on the products checked below:
☐ Republic Bar Rack ☐ Republic Steel Lockers
☐ Contract Facilities ☐ Materials Handling Equipment
☐ Please have a Republic-Berger representative call

Name_____ Title_____
Company_____
Address_____
City_____ Zone____ State_____

Here's the quick, low-cost way to get any Controlled Surface Finish

Are you paying more than necessary to obtain *controlled surface finishes?* You probably are if Gisholt Superfinishing is new to you. You are losing time, money and paying a premium for quality as well, on many jobs.

With Superfinish you preselect the surface finish you need—as high as 80 or as low as 1 micro-inch RMS—and you get it faster, at less cost than by any other method. Rather than an expensive extra step, Gisholt Superfinishing actually eliminates tedious, more costly processes.

Not only do you save time and money, but you get a "controlled" surface finish, free of smear metal—with the true base metal exposed—one that provides greater area contact for heavier loads and longer life in your specific application.

Whether your job requires a 1, 20 or 80 micro-inch finish, setup is fast and easy. Nothing is left to the operator's skill or judgment. Stone pressure and grade, and reciprocation rate are preselected to produce the finish you require, for job lots or large production runs.

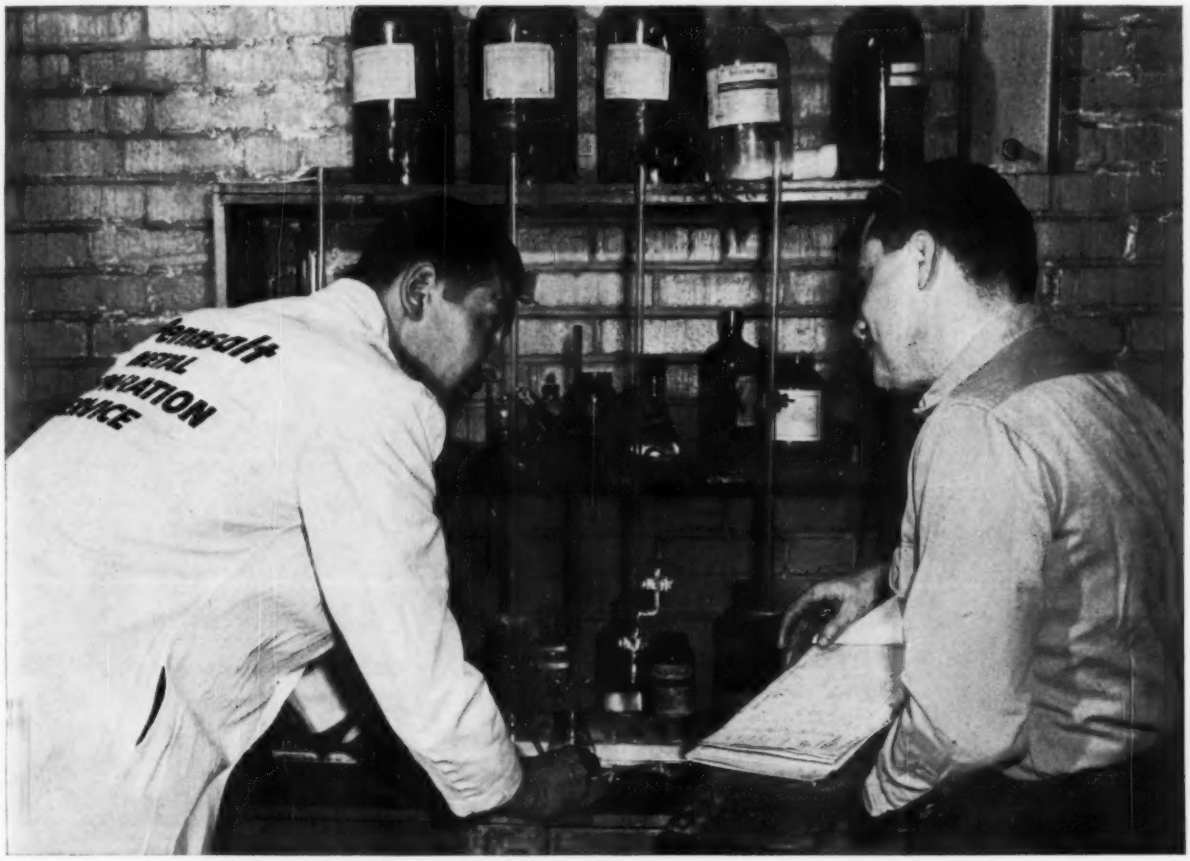
It will pay you to find out how Gisholt Superfinish can cut costs, improve quality and lengthen service life on your standard or problem parts. Ask your Gisholt Representative or write for Bulletin 1169.

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

Investigate Gisholt's Extended Payment and Leasing Plans

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • *Factory-Rebuilt Machines with New-Machine Guarantee*



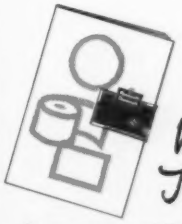
Pennsalt PLANNED SERVICE

helps you get higher efficiency, economy, quality

for **"a better start for your finish®"**

Pennsalt's Metal Preparation Service Plan gives you complete, personalized service by a nation-wide staff of trained specialists. You get periodic surveys of your processes . . . help in modernizing with automatic equipment . . . installation and start-up aid . . . laboratory analyses of your special problems . . . fast emergency service . . . plus other important aids to better finishing.

Service like this . . . exclusive from Pennsalt . . . is another way you profit from Pennsalt's "system approach" to metal surface preparation. Pennsalt supplies a complete line of quality processing compounds, and a plant-proved line of automatic surface treating machines . . . integrates chemicals, machines and service to help you get superior finishing with top economy.



Write Today

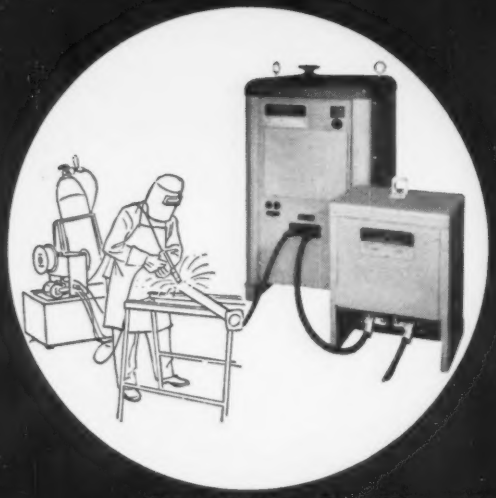
for your copy of this booklet on Pennsalt's Metal Preparation Service Plan, or see your Pennsalt representative for more information on Pennsalt service, materials or machines. Write to Dept. 159

METAL PROCESSING DEPARTMENT

PENNSALT CHEMICALS CORPORATION

East: 3 Penn Center, Philadelphia 2, Pa.
West: 2700 S. Eastern Ave., Los Angeles 22, Calif.

Pennsalt Chemicals®
ESTABLISHED 1850



1ST The outstanding Type RCP Constant Potential Power Source for gas-shielded fully automatic and semi-automatic welding. Available in 500-, 600- and 1000-amp ratings to suit every need. May be used with separate Dynamic Reactor.

2ND A complete 200-amp. Type RCC Constant Current Welding Power Source "package" for use with the popular WEST-ING-ARC® SA-110 and SA-111 semi-automatic hand guns and control monitor. Converts to manual welding use at the flick of a switch.

NOW!

ANOTHER ADVANCEMENT TO EXTEND YOUR WELDING VERSATILITY

Westinghouse

"RCV" Welding Power Source

WITH BUILT-IN DYNAMIC REACTOR

It's the NEW 200-amp, Type RCV Constant Potential Power Source for gas-shielded welding—specifically designed as the most important "companion" for the WEST-ING-ARC SA-120 and 121 hand gun and control monitor.

The RCV Power Source, with its built-in contactor and controls and built-in Dynamic Reactor, opens new fields for welding of light-gauge steels—mild and stainless—aluminum and magnesium. It permits all-position welding . . . reduced welding wire costs . . . improved "wash" and penetration over a broad range of applications and material thicknesses.

Contact your nearest Westinghouse welding distributor or welding sales engineer. Or write: Welding Division, Westinghouse Electric Corporation, Buffalo 5, New York. J-22001

Features:

• Primary circuit breaker with full over-current protection • Thermoguards® in each transformer winding for thermal protection • Single phase—230 volts. May be used where higher primary voltage is not available; reconnectable for 460 volts • Auxiliary transformer for 110 volts to supply control monitor • Built-in contactor—operated by trigger of SA-120 and 121 gun
• Built-in Dynamic Reactor • Bonderized finish
• Dead-front Cam-Lok cable terminals and plug connection

And many other user advantages!

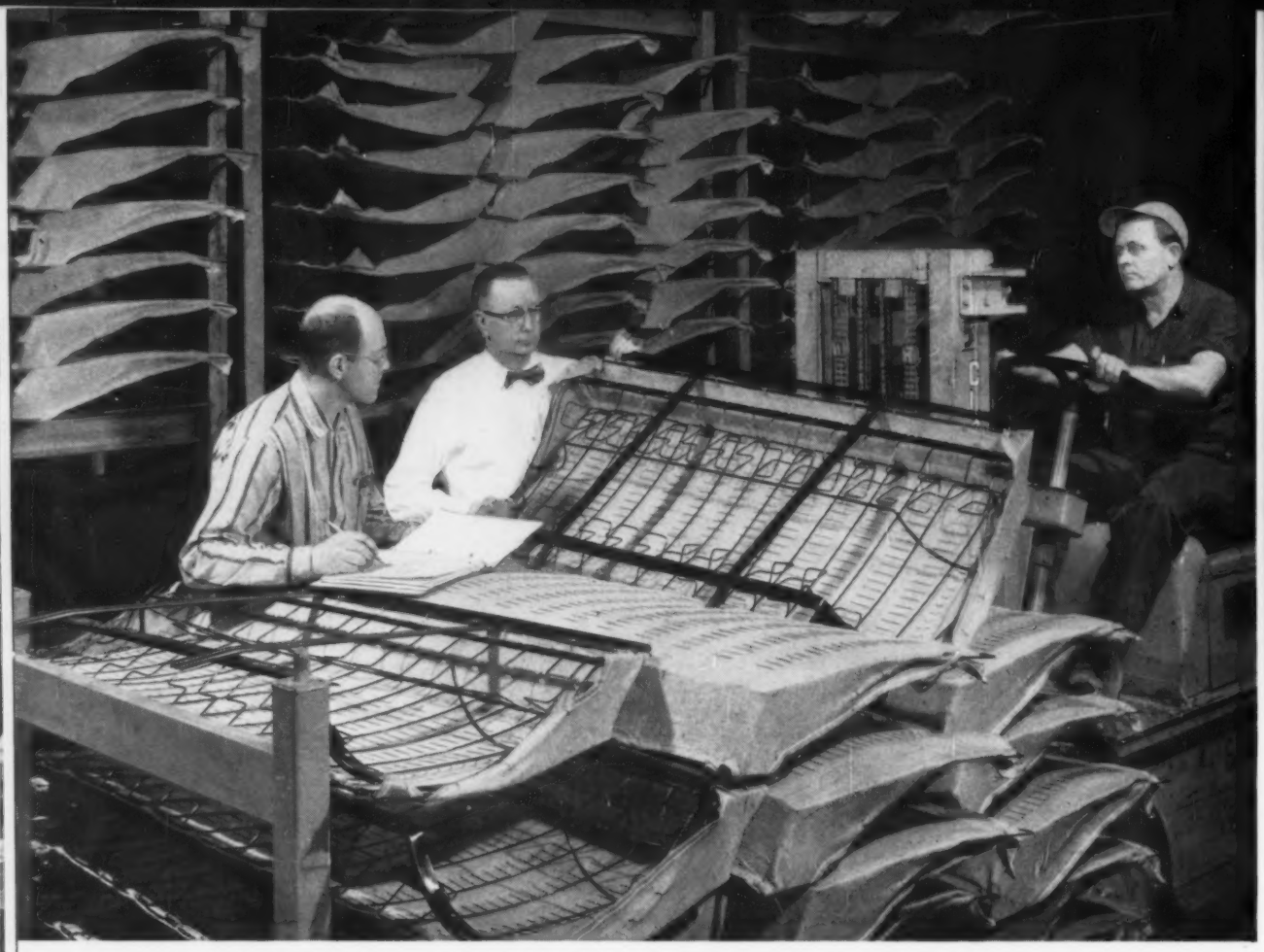
$795 IN ZONE 1

Zones 2 and 3 slightly higher

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

Watch Westinghouse for New Developments in Welding



Completed units await shipment at Reynolds Spring Co., Division of Stubnitz Greene Corp. Looking over seat backs are Plant Manager A. R. Kerr, on the right, and Basil Woodfork, foreman of assembly.

Tough Requirements For New Auto Seat Spring Met Easily With Pittsburgh Steel's Zig-Zag Wire

Stubnitz Greene Corp., Developer of Torflex Springs for 1959 Models, Likes Pittsburgh Steel Wire for Its Uniform Tensile Strength, Good Recovery

A new type of auto seat and back spring which returns economies to both spring maker and his auto producing customers is formed from Pittsburgh Steel Co.'s zig-zag wire because it meets requirements.

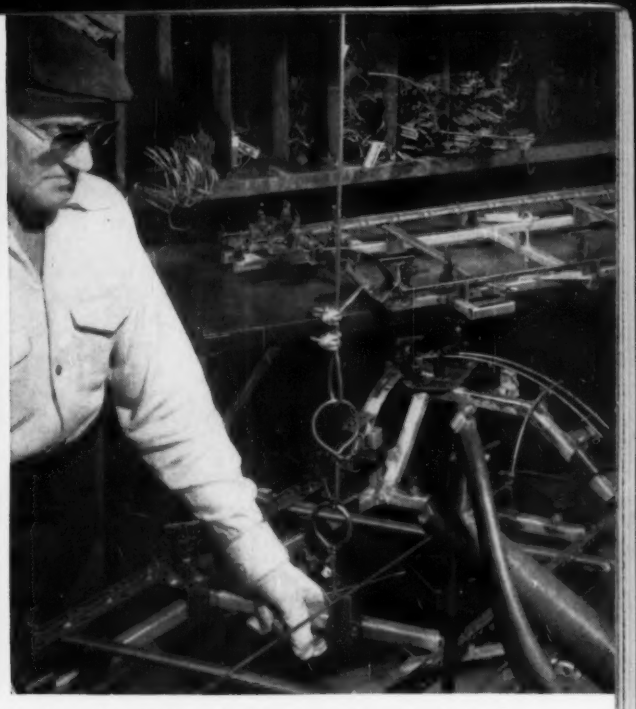
Top requirement for wire used in the new Torflex springs is just the right combination of tensile strength and formability. Pittsburgh Steel Co. is a major supplier because it provides that combination in every coil and in every shipment.

Torflex springs, designed by Stubnitz Greene engineers in 1958 and adopted for use in several 1959 automobile models, won favor because they cut production costs, are precision made for straight edges on finished seats, provide for good deflection ranges and eliminate pounds of dead weight.

"This new design calls for a high tensile zig-zag wire with a great deal of recovery," declared A. R. Kerr, plant manager of the Reynolds Spring Division in Vincennes, Ind. "We require zig-zag wire with a tensile strength of 230,000 pounds per inch and a yield point of 175,000 pounds. We must work within those points to do our forming. Pittsburgh Steel Co.'s wire meets our requirements for strength, formability and recovery."

• **11 gage typical**—The new Torflex spring is formed from Pittsburgh Steel's zig-zag wire in gages ranging from 8 to 12. A typical spring, made of 11-gage wire, measures 40.62 inches in length with a straight 19⅛-inch segment in the middle. This spring has six boxes (loops) at one end, plus a governor loop. On the other end, there are four boxes and a governor loop. Each

Forming Torflex springs from Pittsburgh Steel Co.'s zig-zag wire on forming machine. Here 11-gage MB zig-zag wire is being formed into a spring 40.62 inches long.



Spring elements and other component parts, made of basic wire, brace and border wire and steel strip, are assembled in jigs for spot welding.

box has a different width, from 1.68 inches to 2.38 inches.

"Uniform diameter is very important to us," said Plant Manager Kerr, "since it affects the formation of the boxes as well as their strength and performance. We have found Pittsburgh Steel's wire to be very good on diameter. It's drawn pretty much right on the nose. We've had no trouble."

Torflex springs also require wire free of piping which could cause fractures. Reliable tensiles give long production runs with Pittsburgh Steel wire.

At the Vincennes plant, Pittsburgh Steel's zig-zag wire is cut to length, then formed into springs on special machines designed by Stubnitz Greene engineers. Production per machine exceeds 2,500 springs per day. After forming, springs are bent back on themselves at either end and then heat treated. Heat treating for 30 minutes at 550 degrees Fahrenheit relieves the stresses of cold forming and increases yield strength, helping prevent any tendency of the springs to take a set in long service.

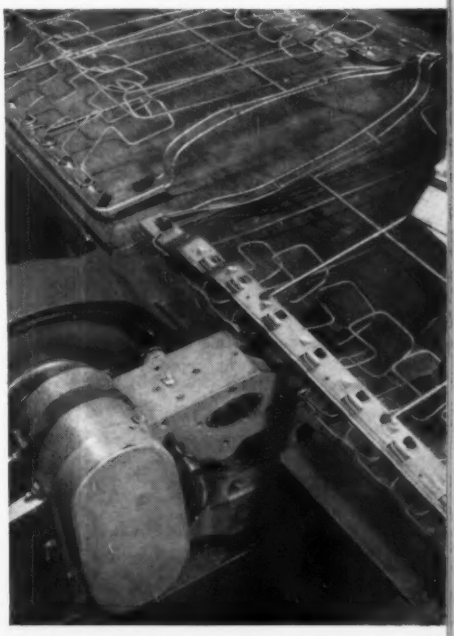
• **Use four kinds of Pittsburgh Steel wires**—Springs and other components are assembled in a jig for spot welding. In each assembly, four different types of a wire supplied by Pittsburgh Steel are used.

Basic wire, in gages 4 to 9, is used in part of the frames for seats and backs. Pittsburgh Steel's brace and border wire is employed for the borders, and upholstery wire in gages ranging from 6 to 16 is used to make the arch springs found at each end of seats and backs.

After assembly, seats and back units are covered with burlap as a base for upholstery and then shipped to customers.

Perhaps you have a new design which calls for something special in wire quality.

Pittsburgh Steel manufacturers wire, whether it's wire for cold heading, screws, wire rope or coiled springs, offers you the same benefits realized by Stubnitz Greene—low production costs, uniformity, specific tensile and yield strengths. Trained mill specialists can help with any wire problem. You can put these benefits to work for you immediately. Start by writing or telephoning the nearest district sales office listed here.



Spring elements are clipped to top border wire. Elements are formed from Pittsburgh Steel Co.'s zig-zag wire.

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES

Atlanta	Cleveland	Detroit	Los Angeles	Pittsburgh
Chicago	Dayton	Houston	New York	Tulsa
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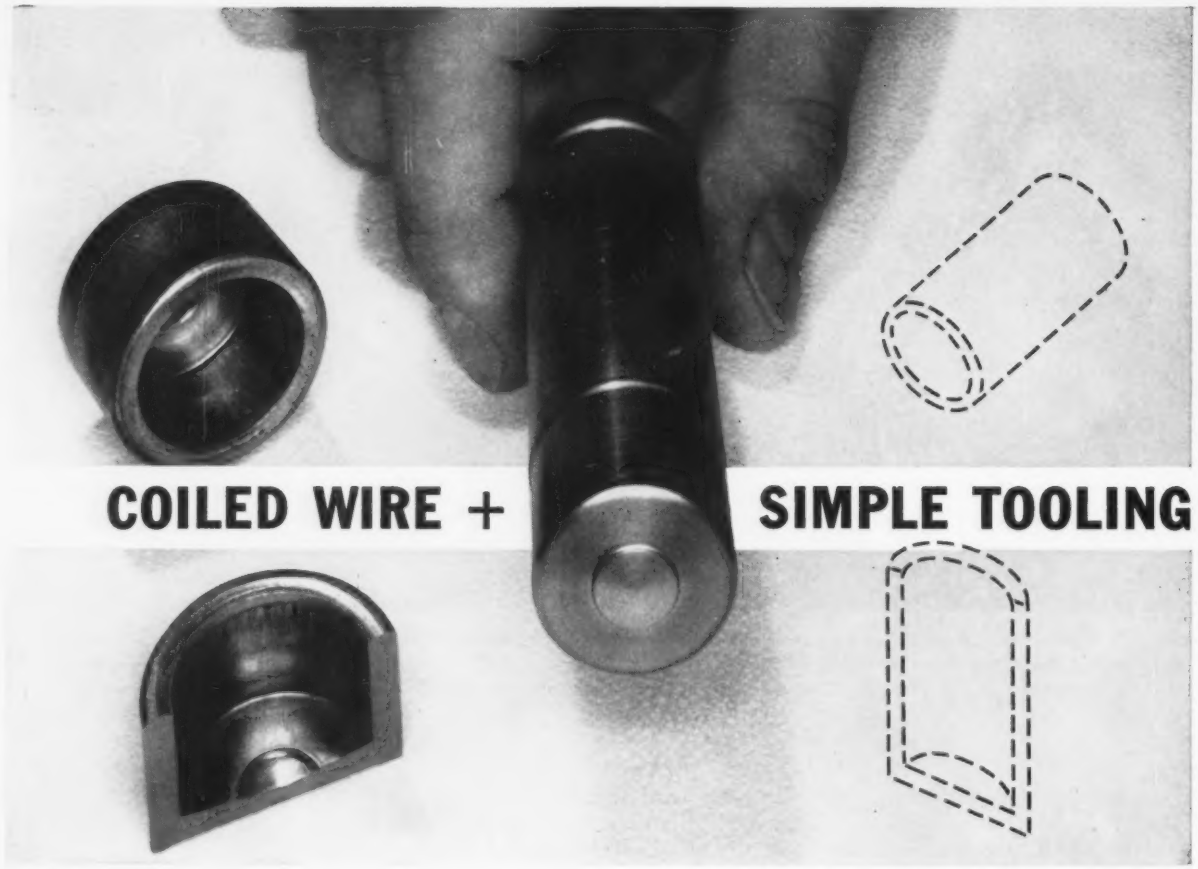
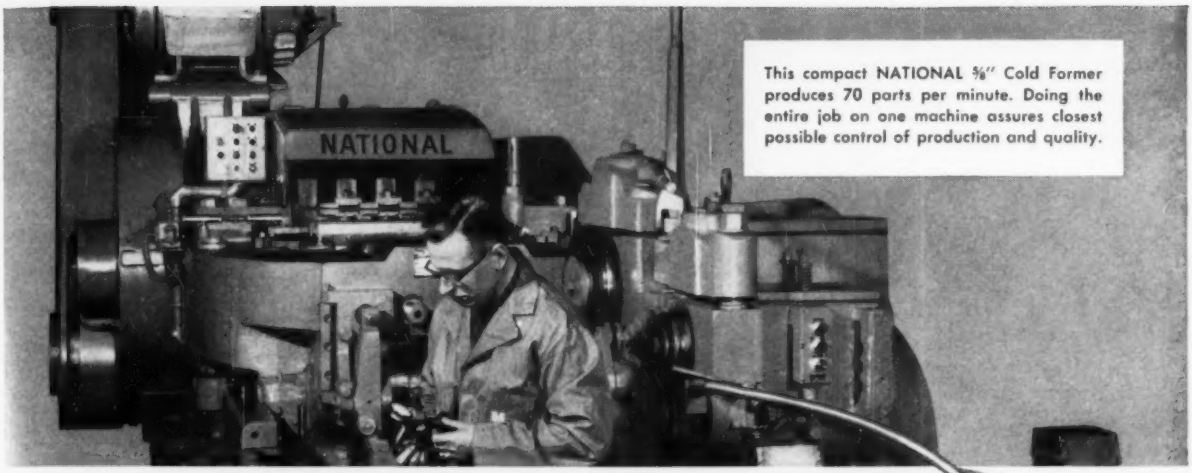


In cold-forming hollow parts from wire, the extrusion punch is the most critical and perishable element of the tooling. And yet, the typical steel punch shown above costs only a few dollars. Punch life for the universal joint bearing cup part is excellent.

Part "X" (name and illustration withheld at customer's request) is a deeper extrusion of higher-carbon material. Punch life for this practically-finished part is also remarkable even though the blanks – cut off from wire right in the Former – *are not end-coated!*

These are two more important cold-extruded jobs which forward-looking U. S. parts makers are now producing – automatically and successfully from coiled wire – on NATIONAL Cold Formers. No slugs to prepare, no in-between heat-treating or annealing, less handling, and many fewer operations.

PART	UNIVERSAL JOINT BEARING CUP	PART "X"
MATERIAL	C-1008 Drawn Coiled Wire	C-1016 Drawn Coiled Wire
MACHINE	3/4" NATIONAL Cold Former	1/2" NATIONAL Cold Former
PARTS PER MINUTE	60	80
EXTRUSION DIE LIFE	Practically Unlimited	Practically Unlimited
IS PART IN PRODUCTION?	Yes, at Pottstown Div. Dana Corp., Pottstown, Pa.	Yes, plant name and location withheld by request



This compact NATIONAL ⅝" Cold Former produces 70 parts per minute. Doing the entire job on one machine assures closest possible control of production and quality.

+ COLD FORMER = LOW COST PARTS!

WHAT IS THE BEST WAY TO DO AUTOMATIC COLD FORMING?

ANSWER: Produce from wire! Cold Formers and Progressive Headers are built upon our conventional Cold Nut Former and Boltmaker designs.

Is Material Expensive?

No. Coiled wire is low-cost material. (Of course, none is wasted by *forming*).

How Long Do Other Tooling Items Last?

Using bearing cup job as an example: Cutter and quill, hundreds of thousands of parts each; carbide die life is measured "by the millions."

What Preparation Does Coiled Wire Need?

None. You buy inexpensive drawn wire, ready to start into the Former.

How Do You Get the Initial Blank?

The Former cuts off accurately, and automatically transfers the blank from station to station until finished.

Do Physical Properties Measure Up?

They are excellent. Cold Forming actually improves them.

What About Labor and Floor Space?

Materially reduced. Verify by comparing Cold Forming with your present methods.

What Are the Biggest Advantages?

With the NATIONAL Cold Former you produce parts complete from coiled wire. You eliminate many operations and related handling problems. Result? More quality parts at lower production cost!

Can Your Jobs Be Made More Profitably by Automatic Cold Forming?
We Welcome You to Tiffin for a Discussion of Your Work

Founded 1874—DESIGNERS and BUILDERS of MODERN FORGING MACHINES • MAXIPRESSES • REDUCEROLLS • COLD HEADERS BOLTMAKERS • NUT FORMERS • TAPPERS • NAILMAKERS CO-PIONEERS WITH INDUSTRY OF ADVANCED METALWORKING PRODUCTION METHODS

NATIONAL MACHINERY CO.

TIFFIN, OHIO, U. S. A.

HARTFORD DETROIT CHICAGO

integrated CRUCIBLE steel service

Orders for specialty steels go out fast — usually overnight or even earlier — from *local* Crucible warehouses.

That's because each warehouse has a wide variety of grades and sizes on hand, *at all times.*

gives you local stocks of 16,000 specialty steel items for immediate delivery

Within minutes, the Crucible inside account salesman can tell you if the grades, sizes and quantities you need are available. He'll check his customer's master file for your delivery requirements, billing details, etc. And then he'll quickly arrange for cutting to meet customer's requirements. So deliveries are swift and sure.

This combination of large local stocks and warehouse efficiency means you can fill even the most varied or unusual requisitions for specialty steels with a single phone call.

It's a basic reason why purchasing agents who *depend* on local sources call Crucible *first* – like this one:

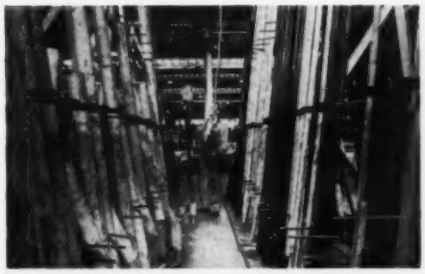
"We're basically a tool and die 'job' shop. We never know what steel we'll be using from one day to the next. So whatever we need, we need fast. It has been our experience that it saves time to call the Crucible warehouse first."

Why not simplify and speed up your specialty steel purchases by relying on your local Crucible warehouse? The advantages of Crucible's entire integrated operation, from mining the ore to steelmaking and warehouse delivery, are all available through the nearby source. *Crucible Steel Company of America, Dept. PF06, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

STOCK LIST

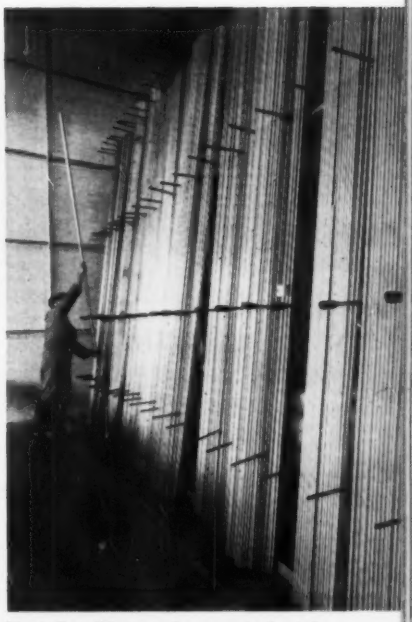
Keeps you up-to-date on local stocks of specialty steels. Just ask the Crucible salesman to place your name on the regular mailing list.

One Source For All These Steels



Local warehouse can fill both large and small orders from stocks like these of hollow tool steel sections and solid rounds.

Die casting die steels and plastic mold steels stand ready for cutting to order and immediate delivery.



Most Crucible warehouses stock stainless bars — stack them upright in "A" racks to protect the surfaces.

TOOL STEELS—Water, oil, air hardening, shock resisting, hot work, plastic and die casting steels in all forms, including bars, sheets, plates, drill rod, hollow bars, forgings and flat ground stocks

HIGH SPEED STEELS—Crucible's famous "Rex"® steels: Rex Thrift Finish rounds, hot rolled and cold drawn flats and squares, drill rod, forgings, sheets, plates, and tool bits

STAINLESS STEELS — Bars, sheet, strip, wire, cold heading wire, metalizing wire, plates, angles

FREE MACHINING STEELS — Crucible Max-el® rounds, hexagons, plates and brake die steel

ALLOY STEELS — Bars, billets, strip and sheet

COLD ROLLED CARBON SPRING STEELS

DRILL STEELS — Hollow and solid drill steels

ALUMINUM EXTRUSION DIE STEELS

HOLLOW TOOL STEEL

WELDING AND HARD FACING ROD

PLASTIC MOLD STEELS

PERMANENT MAGNETS

— and many others

Need stainless sheet? The local warehouse stocks most types, finishes and sizes for prompt delivery to you.

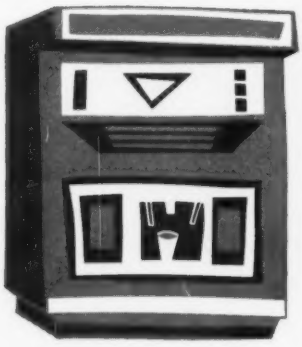
CRUCIBLE STEEL COMPANY OF AMERICA

Branch Offices and Warehouses: Atlanta • Baltimore • Boston • Buffalo • Charlotte • Chicago • Cincinnati • Cleveland • Columbus Dallas • Dayton • Denver • Detroit • Erie, Pa. • Grand Rapids • Harrison • Houston • Indianapolis • Kansas City • Los Angeles Milwaukee • New Haven • New York • Philadelphia • Pittsburgh • Portland, Ore. • Providence • Rockford • Salt Lake City • San Francisco • Seattle • Springfield, Mass. • St. Louis • St. Paul • Syracuse • Tampa • Toledo • Tulsa • Toronto, Ont.

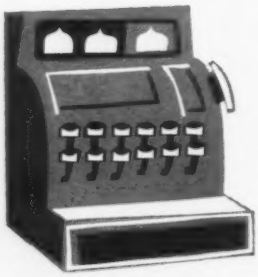
Looking for a bright idea for your product?

LOOK TO BROWN LIPE CHAPIN

HOME APPLIANCES



VENDING MACHINES



BUSINESS MACHINES

MUSIC & COMMUNICATIONS

An experienced source of decorative and functional die castings and stampings!

Consider Brown-Lipe-Chapin when you're planning ways of adding "hard sell" to your product. Brown-Lipe-Chapin, with extensive facilities for die casting, metal stamping—including steel and aluminum, and electroplating, can help give your product distinctive new eye appeal with a new dimension in durability.

YOU GET A CREATIVE APPROACH

Brown-Lipe-Chapin, experienced in providing the mass-consumer field with quality bright work, takes a creative approach to your design problems. An experienced staff of engineers work out the best and most economical method of producing your parts.

YOU RECEIVE CONSTRUCTIVE ASSISTANCE

You can count on Brown-Lipe-Chapin for constructive suggestions that often add up to savings in time and money. They'll tackle your most difficult part . . . even if it's up to six feet in length. And complete facilities for die casting, steel or aluminum stamping, anodizing, electroplating and painting are all under one roof.

YOU BENEFIT FROM RELIABILITY BY BROWN-LIPE-CHAPIN

You're assured of reliability with Brown-Lipe-Chapin . . . *reliability* in step-by-step quality control, work performed by craftsmen who are experienced in meeting the rigid specifications of the automotive industry . . . *reliability* in meeting your delivery schedules right on time . . . *reliability* in facilities that can be quickly converted to model change-overs . . . and *reliability* as a continued source of supply. Brown-Lipe-Chapin will guarantee to supply your requirements for die casting and stamping for as long as you may want to specify.

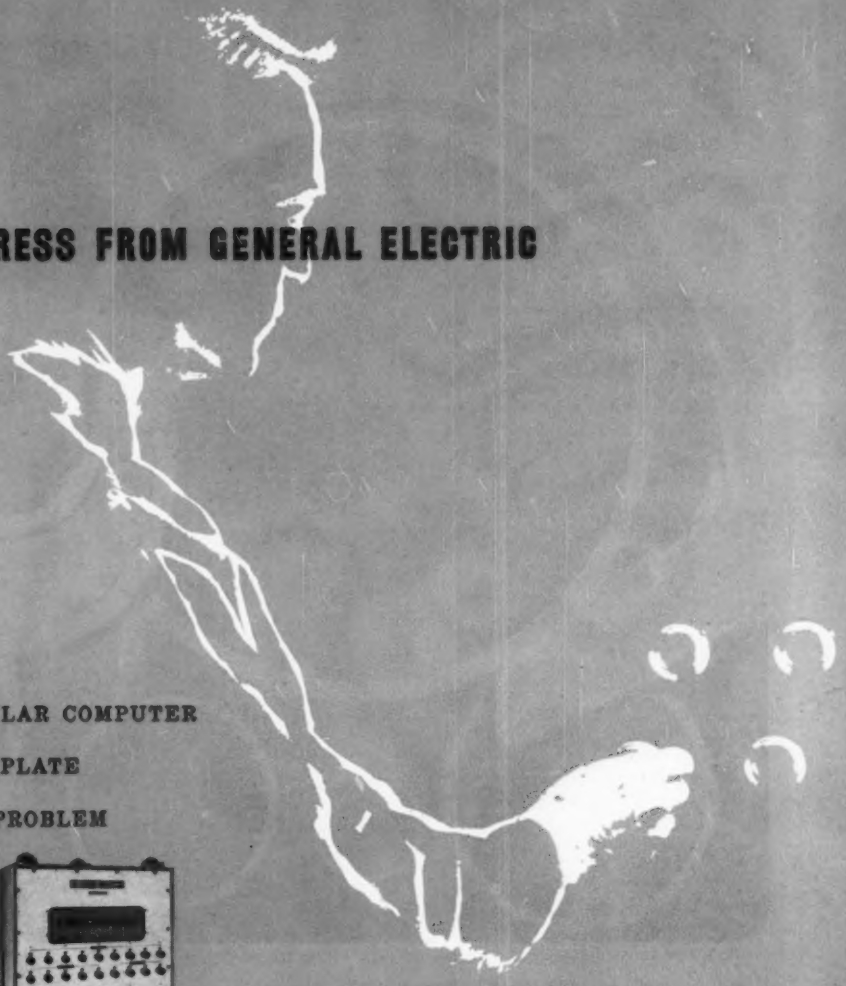
Brown-Lipe-Chapin's two plants, in Syracuse, New York and Elyria, Ohio, combine 25 acres of modern plant facilities that are ready to go to work for you now. So, before the die is cast on your product designs, contact Brown-Lipe-Chapin, Division of General Motors Corporation, Syracuse, New York.

GM GENERAL MOTORS

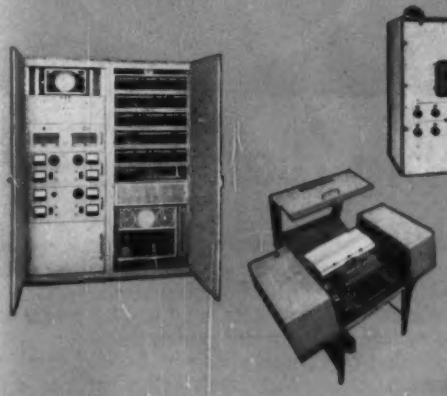
RELIABILITY by BROWN·LIPE·CHAPIN

DIVISION OF GENERAL MOTORS CORPORATION

COMPUTER PROGRESS FROM GENERAL ELECTRIC



CUSTOM DESIGNING MODULAR COMPUTER COMPONENTS TO SOLVE A TINPLATE INSPECTION AND BILLING PROBLEM



GE 302 AUTOMATIC INSPECTION DATA ACCUMULATOR

The trend toward purchase of tinplate direct in large coils rather than sheets placed an unusually difficult inspection and billing problem upon manufacturers. The G-E 302 Automatic Inspection Data Accumulator—custom-designed by the Computer Department—solves this problem by electronically accumulating and tallying data from inspection sensors in a new solid-state system. The system is fully automatic ...provides a complete type-written record for quality control and billing purposes immediately upon completion of each coil.

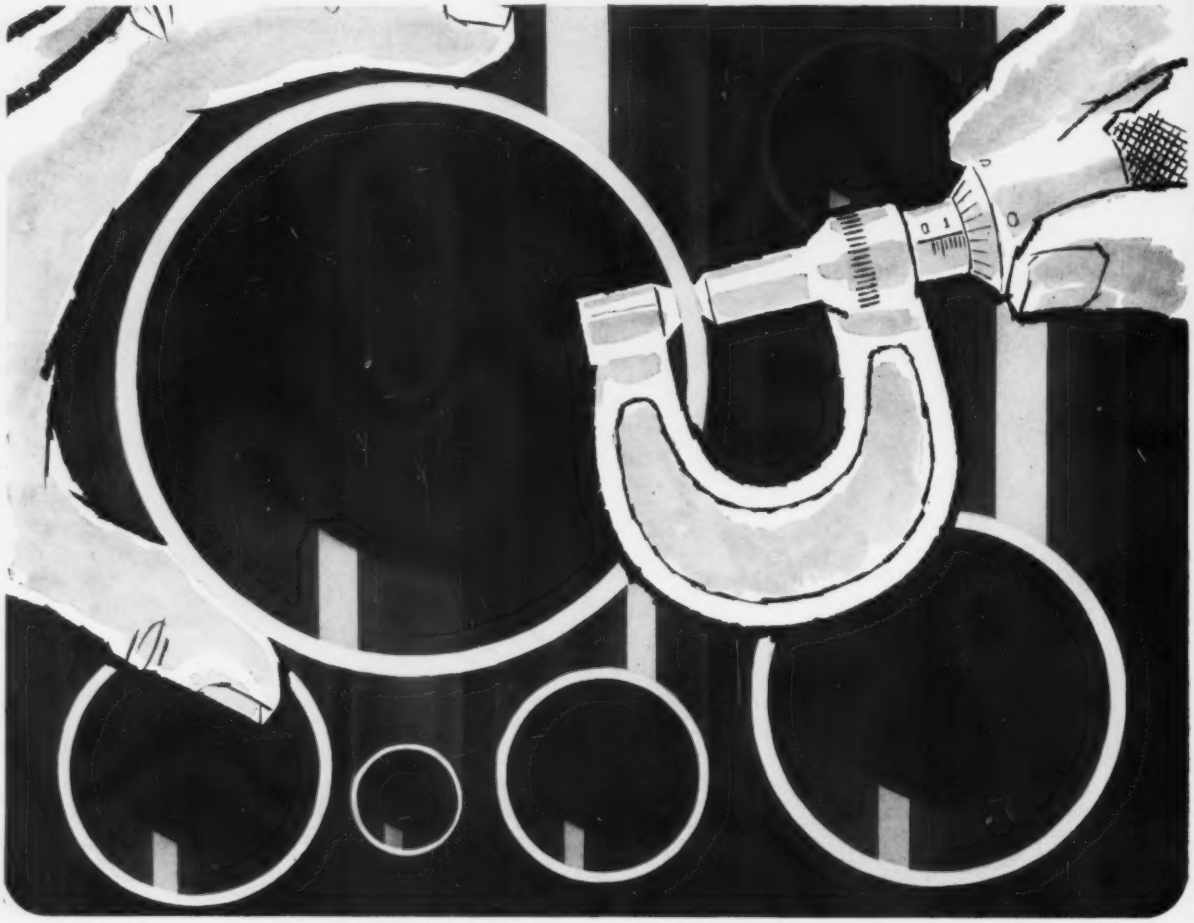
Request brochure CPB-14B. Contact your nearest General Electric Apparatus Sales Division Office, or write to: Computer Department, Room 4400 General Electric Company • Deer Valley Park • Phoenix, Arizona

Progress Is Our Most Important Product

GENERAL ELECTRIC

FOR FIGURES IN A HURRY—FIGURE ON A GE COMPUTER

Experience *— the added alloy in* ***Allegheny Stainless***



looking for thin walls in big diameters?

A-L now offers a wide range of stainless seamless tubing with walls as thin as .013".

From what other source would you expect to get stainless seamless tubing of 3½" OD with walls as thin as .058" and in the widest range of materials anywhere to fit a broad range of requirements in new products and processes?

Allegheny Stainless Tubing ranges from 3/16" OD to 3½" OD with wall thickness from .013" to .375". Typical of the specials A-L can make are 2½" OD—.032" wall thickness, 3" OD—.042" wall thickness and 3½" OD—.058" wall thickness. All sizes with true circularity, no dents or handling marks.

Stainless seamless tubing is made in all stainless grades including 309, 317, 318, 310, 416 and 446—normally difficult to obtain. For special high-temperature applications, A-L produces tubing in high-strength alloys such as A-286, and in vacuum melted steels and alloys. Also in custom analyses such as low cobalt (.01-.05) grades and with boron additions to standard grades.

A-L also makes composite tubes with bonded combinations of carbon and stainless steels and other metals for unusual corrosion applications in process equipment.

Allegheny Ludlum Tubing is available in small orders in random or cut lengths. Standard grades in stock throughout the country.

Write for your copy of Allegheny Ludlum Stainless Tubing, or call your A-L representative for all the help you need. ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa. Address Dept. A-18.***

NEW!
FREE—A-L's new book on stainless tubing 32-pages of technical data, sizes, grades and suggested applications.

WSW 7828

AL

ALLEGHENY LUDLUM

for warehouse delivery of Allegheny Stainless, call RYERSON

Export distribution: AIRCO INTERNATIONAL

EVERY FORM OF STAINLESS . . . EVERY HELP IN USING IT

HYATT ROLLERS ARE MATCHED WITHIN 50 MILLIONTHS OF AN INCH SO THEY WILL RUN LIKE A FINE JEWELED WATCH!

Automatic electronic controls and precision testing equipment—under the watchful eyes of conscientious craftsmen—give HYATT Hy-Rolls a standard of quality never before achieved in quantity production.
For maximum performance per bearing dollar, insist on . . .

HYATT *HY-ROLL BEARINGS*
FOR MODERN INDUSTRY
HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

NO BEARINGS carry radial loads like cylindrical bearings . . .
and NOBODY knows them like HYATT

NOW YOU CAN GRIND AND FINISH W

NEW BAYFLEX DOUBLE-DUTY IS

Illustrations above show Bayflex Double-Duty in action, held at correct angle for weld bead grinding (top) and for finishing (bottom)

SH WITHOUT CHANGING WHEELS!

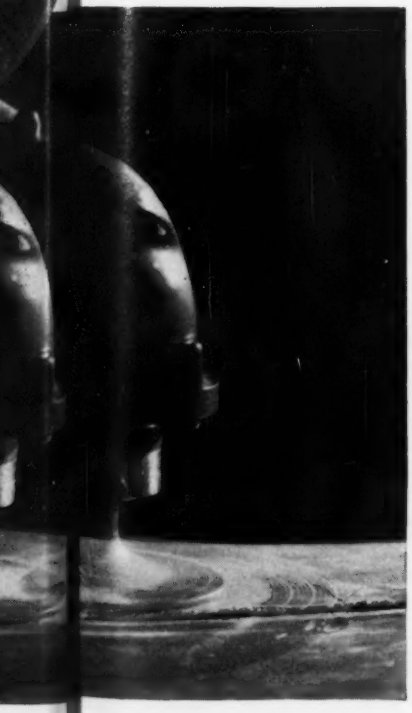
There are two important angles to consider before you buy new weld-grinding or finishing wheels. Bay State's new Bayflex Double-Duty raised hub disc-wheel has them *both!*

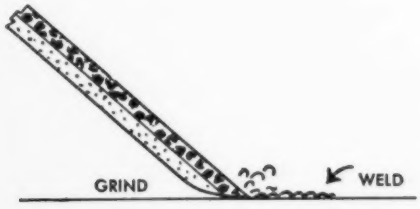
The "DD's" unique, two-layer construction gives you two grinding angles: One is 30° - 45° which gives you fast stock removal for grinding weld beads . . . and the other is 10° - 20° which gives you a finish without gouging, a finish so smooth it's just short of a polished surface.

The upper layer for weld grinding comes in a single, standard specification. The lower finishing or blending layer comes in your choice of five different grits (24, 36, 54, 80 and 120) for every type of finishing job from heavy steels through light stainless sheets to aluminum and copper.

Your Bay State representative is ready now to demonstrate the Bayflex Double-Duty in your plant under normal working conditions. Get in touch with him and see what he can do to cut costs and speed up your weld grinding. You'll find he's more than a good salesman . . . because he's an experienced abrasive specialist, too. *Better grinding at lower cost . . . that is his business.*

IS 2 WHEELS IN 1





Upper layer removes stock rapidly when disc is held at 30° - 45° angle.

Lower layer smooths and blends surface when held at 10° - 20° angle.

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Mass.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh, Los Angeles.
Distributors: All principal cities

Automotive Power Steering Manufacturer Specifies

OSTUCO *Mechanical Seamless Tubing*

Cold drawing Ostuco tubing through precision ring die on cold draw bench at Shelby mill. Mandrel controls and sizes I.D.

"Automotive components are our business. We have produced literally millions. And we're still learning every day.

"One of the lessons we learned early in the game is that you can't beat Ostuco tubing for surface finish. It cuts our machining costs, keeps us on top competitively.

"There are other reasons, too, why Ostuco tubing tops our preferred list. We like its consistently close tolerances and unvarying quality, shipment after shipment. You might say we like its *product integrity* . . ."

To learn more about what Ostuco tubing can do for *your* production, contact your Ohio Seamless representative, listed in the Yellow Pages, or the mill at *Shelby, Ohio — Birthplace of the Seamless Steel Tube Industry in America.* AA-9481

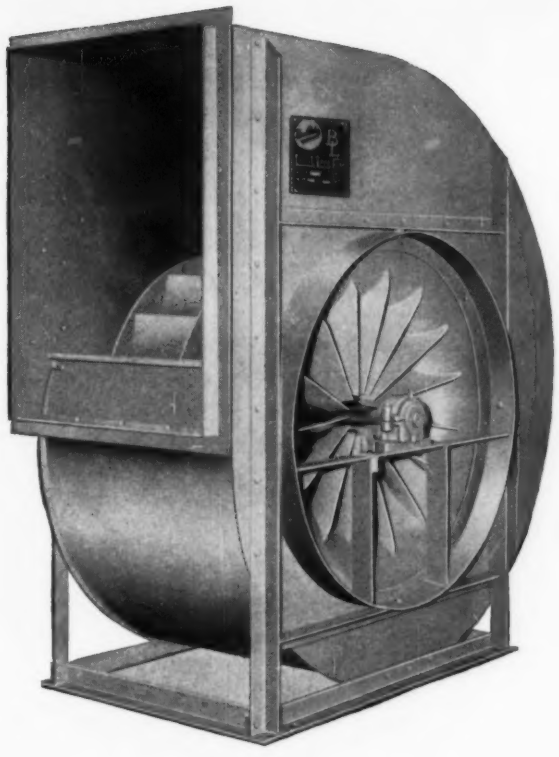
OSTUCO TUBING

OHIO SEAMLESS TUBE DIVISION

of Copperweld Steel Company · SHELBY, OHIO

Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

SALES OFFICES: Birmingham, Charlotte, Chicago (Oak Park), Cleveland, Dayton, Denver, Detroit (Huntington Woods), Houston, Los Angeles (Lynwood), Miami, Moline, New Orleans (Chalmette), New York, North Kansas City, Philadelphia (Wynnewood), Pittsburgh, Rochester, St. Louis, St. Paul, Salt Lake City, Seattle, Tulsa, Wichita CANADA: Railway & Power Engr. Corp., Ltd. EXPORT: Copperweld Steel International Company, 225 Broadway, New York 7, New York



"Buffalo" Type "BL" Fan For Supplying Ventilating, Air Conditioning & Air Cleaning Systems.

MAXIMUM AIR MOVING EFFICIENCY WITH MINIMUM MAINTENANCE

Quiet, efficient, economical operation of the "Buffalo" Type "BL" Fan in general air moving service is assured by these superior "Buffalo" engineering features:

- The smoothly-curved true half circle inlet bell holds turbulence to a minimum. Fixed directional guide vanes are standard; variable inlet vanes are optional.
- Streamlined wheel with backward curved blades attains peak efficiency. All wheels are factory tested and balanced to minimize vibration.
- Smoothest possible air flow is enhanced by the correctly shaped scroll of the wheel-contoured housing.
- "Buffalo" designed non-overloading factor provides stable, quiet output from free delivery to shutoff.
- Rugged "Buffalo" construction (extra-heavy at points of greatest strain and wear) insures unsurpassed dependability and long, maintenance-free life. This, in turn, results in the absolute minimum maintenance time for which all "Buffalo" products are noted.

Be sure to investigate the "Buffalo" Type "BL" Fan for your Class I and II air moving jobs. Call your nearby "Buffalo" engineering representative, or write for Bulletin F-104.

"Buffalo" Fans bring you the famous "Q" Factor — the built-in QUALITY that provides trouble-free satisfaction and long life.

BUFFALO FORGE COMPANY
Buffalo, N. Y.
Buffalo Pumps Division, Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING • AIR CLEANING • AIR TEMPERING • INDUCED DRAFT • EXHAUSTING • FORCED DRAFT • COOLING • HEATING • PRESSURE BLOWING

WHERE CAN YOU USE THESE

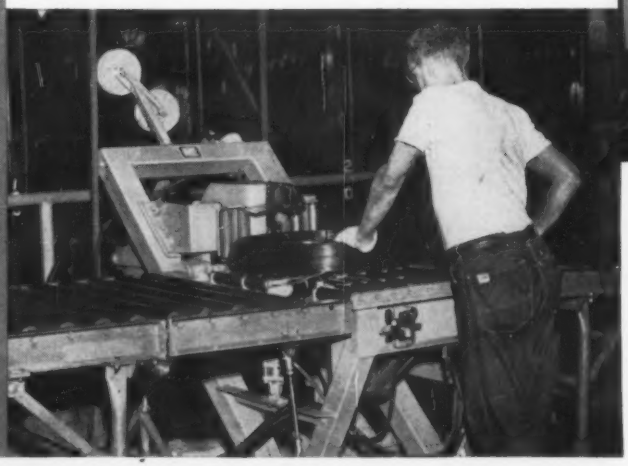
Versatile powered machines for automated strapping stations

Versatility is a key feature of the new Acme Steel Powered Strapping Machines. Simple in design, compact in construction, they can be mounted in any position and automated to any degree to meet the requirements of the installation. The basic units are augmented with specialized fixtures and accessories to fit your particular production flow and strapping needs.

Let your Acme Idea Man initiate development of Ideas to improve your strapping and packaging procedure based on the versatile new Acme Steel F4 or F5 Strapping Machines.

Conduit is securely bundled and strapped with F4 machines. Strap track and fixtures for nesting and ejecting are built into machine, assuring neat, uniform and tightly strapped bundles automatically. Machines are mounted on tracks for moving in and out for correct spacing of strap regardless of conduit length.

Sheet in coils is strapped by one operator at conveniently placed push button control box. F5 machine is equipped with full track for wide range of coil sizes. Basic tensioning and sealing unit pivots into position and back allowing for variations in coil diameters.



Wire in coils strapped with "push button" F4 machine. Coils of wire are conveyed onto indexing table and rotated into position for each strap. The basic F4 strapping unit can be pivoted by a button control allowing the seal to be applied on either the face or underside of coil.

NEW STRAPPING MACHINES?

This basic unit is the core of a customized strapping station

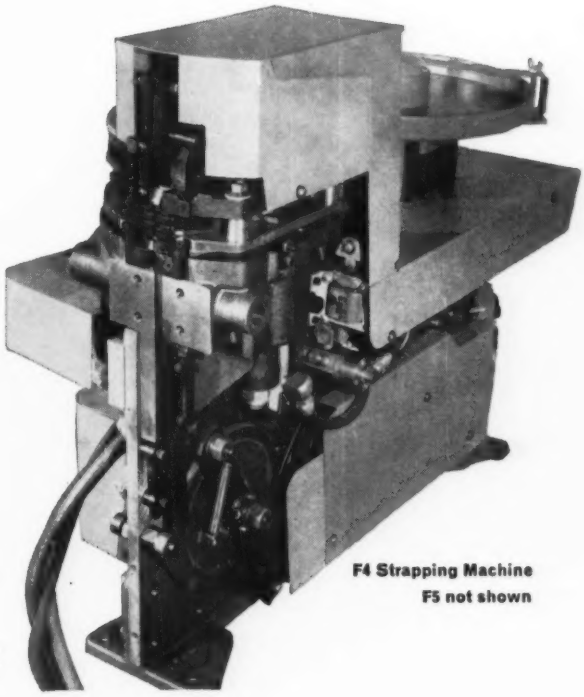
The new Acme Steel Powered Strapping Machine applies strapping to a complete range of packs. It tightens each strap to a predetermined, uniform, dial-adjusted tension, then seals and cuts it. Seals are fed from coils and up to 5000 can be made without reloading. This saves down time and speeds long production runs.

Strap is fed, tensioned, sealed and cut, all with power. And controls can be designed as semi-automatic, automatic, or fully automated.

The new machine is of extremely simple, dependable design. Maintenance is minimal, but when needed is quick and easy due to unusual access features.

The unit can be adapted into any production line. Whatever your strapping problems may be, your Acme Idea Man and engineers will suggest ways the new power strapping machine can be adapted to your needs.

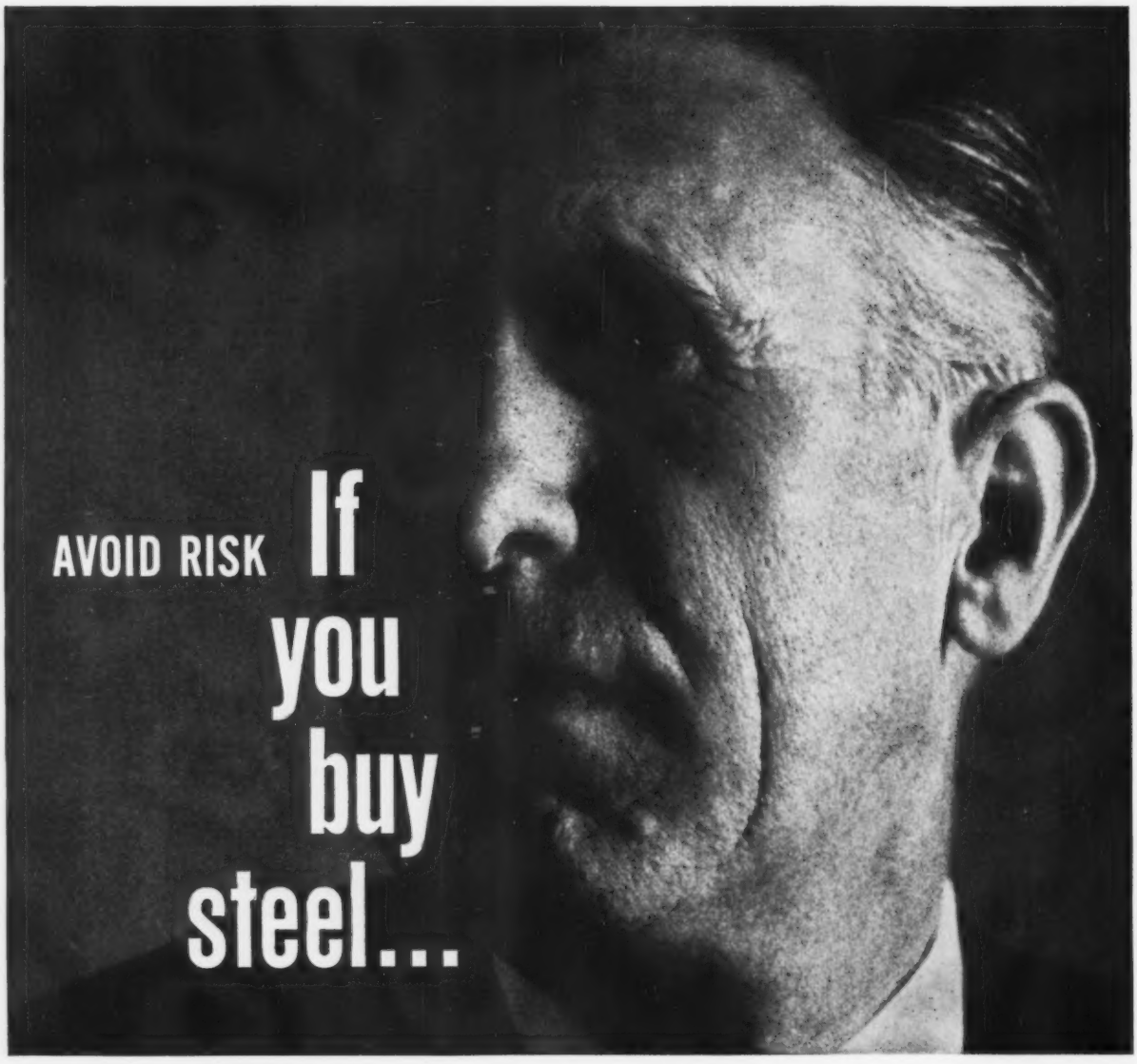
Write Acme Steel Products Division, Dept. IFS-69, Acme Steel Company, Chicago 27, Illinois. In Canada, Acme Steel Company of Canada, Limited, 743 Warden Ave., Toronto 13, Ontario.



F4 Strapping Machine
F5 not shown

- **Power operation . . . no manual effort**
- **Uniform strap tension . . . dial adjusted**
- **Unlimited strap feed and take-up . . . no limitations on package size.**
- **Makes its own seals**
- **Design simplicity means easy maintenance, dependability**

ACME STEEL **STEEL STRAPPING**



USE OUR CAPITAL to cut your storage space costs

Using our large steel stocks saves you the costs of a big chunk of expensive storage space. And you can free-up and convert this tied-up space to more productive, profitable use. That's good business.

Since our labor, our equipment cuts your steel, does preliminary processing for you . . . you save the investment—the costs—of using your own labor and equipment. You save handling expense and other inventory costs. Whatever your steel need, there's a nearby Steel Service Center set up to serve you quickly from stock.

If you're putting steel in your inventory because you think it's a bargain, compare *all* of your costs of possession with the cost and *freedom-from-risk* of buying steel from your Steel Service Center. Use this chart. Or, to be more precise, get the booklet, "What's your real cost of possession for Steel" from your convenient Steel Service Center. American Steel Warehouse Association, 540 Terminal Tower, Cleveland 13, O.

COST OF POSSESSION FOR STEEL IN YOUR INVENTORY

Per ton delivered	_____
Cost of capital:	
Inventory	_____
Space	_____
Equipment	_____
Cost of operation:	
Space	_____
Materials handling	_____
Cutting & burning	_____
Scrap & wastage	_____
Obsolescence	_____
Insurance	_____
Taxes	_____
TOTAL	_____

COST OF FREEDOM-FROM-RISK STEEL FROM YOUR STEEL SERVICE CENTER

Per ton, cut-to-size, and delivered

TOTAL _____

AMERICAN STEEL WAREHOUSE ASS'N

The American Steel Warehouse

...YOUR STEEL SERVICE CENTER

ESCO CENTRIFUGAL CASTINGS KEEP

MACH 17 IN A TUBE!

Tremendous pressures and temperatures are generated in this shock tube at Lockheed Aircraft Corp., to simulate conditions encountered by a long-range ballistic missile re-entering the earth's atmosphere. High pressure gas triggers shock waves which travel 17 times the speed of sound. Instantaneous temperatures range above 15,000 degrees F.

The 44-foot long tube is an assembly of *ESCO* heavy-wall Spuncast® castings hydrostatically tested at 10,000 PSI. It is typical of the many exacting casting jobs that wind up at *ESCO*.

Simplify your design problems by calling *ESCO* for special alloy steel Spuncast pipe, standard heavy wall fittings, and special design fittings and valves.

ESCO®

ELECTRIC STEEL FOUNDRY COMPANY

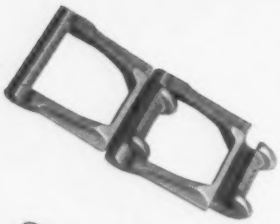
2184 N. W. 25TH AVE. • PORTLAND 10, OREGON

MFG. PLANTS AT PORTLAND, ORE. AND DANVILLE, ILL.

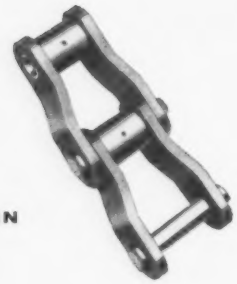
Offices in Most Principal Cities

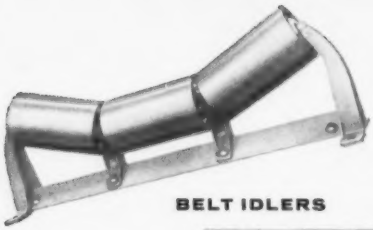
ESCO INTERNATIONAL, NEW YORK, N. Y.

IN CANADA ESCO LIMITED

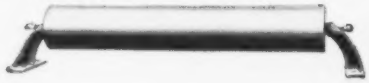


CHAIN





BELT IDLERS



Jeffrey equipment stocked for shipment

BUCKETS

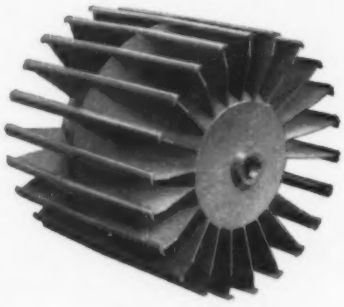
SPROCKETS

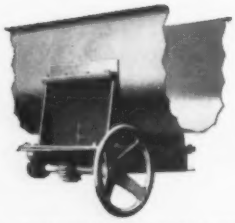
From factory or distributor stocks you can get fast service on a host of Jeffrey products...for elevating and conveying machinery and many industrial applications.

When replacing parts or modernizing machinery, it's wise to use genuine Jeffrey equipment. Highest manufacturing standards, based on years of experience, assure dependable performance. For service, call your Jeffrey distributor or write The Jeffrey Manufacturing Company, 925 North Fourth Street, Columbus 16, Ohio.

PULLEYS

PILLOW BLOCKS



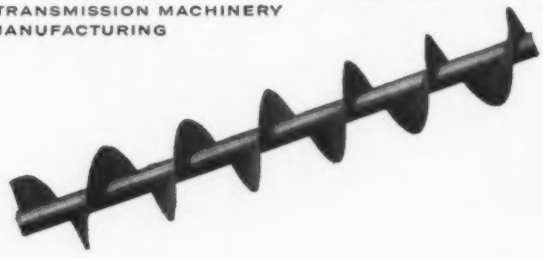


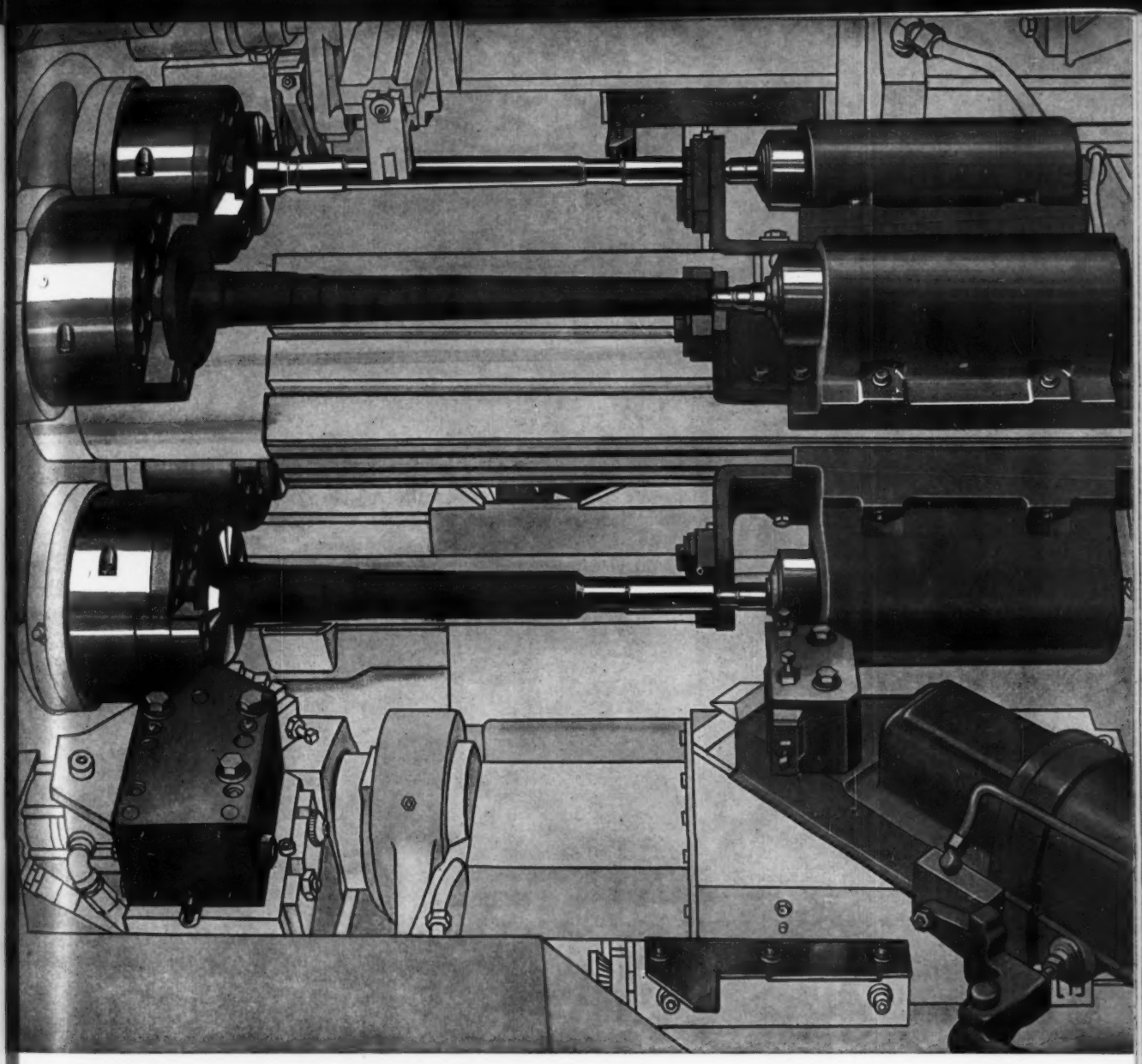
DISCHARGE VALVES

JEFFREY

CONVEYING • PROCESSING
MINING EQUIPMENT. .TRANSMISSION MACHINERY
CONTRACT MANUFACTURING

SPIRAL CONVEYORS





idea *for volume producers of shafts*

Economists are making startling predictions on this year's increase in productivity. They say it will be twice that of recent years – up as high as 10% in some manufacturing industries.

Whether or not these predictions come to pass, it's certain that it won't happen in plants using outdated equipment.

Shaft work is a problem to many firms. New Britain pioneered template-controlled contour turning and boring, solving the problem for many progressive companies. Now for the manufacturer with really high volume requirements we present Model 412/25—a four-spindle, template-controlled machine capable of producing a four-fold increase in productivity per man hour.

The basic principle pretty much speaks for itself. As in the case of the single-spindle contour lathe, inexpensive metal templates control the full cycle and re-cycle if required. Simple, single-point tools replace complex gang tooling. Set-up is simple and fast. When tools wear, merely replace them. Since all relationships are maintained by the template, tool replacement involves no problem.

When the volume of contour turning warrants it, this machine can be the best money maker on the production floor. Your New Britain representative can quickly tell you after looking at your prints and learning of your production requirements. Meanwhile, we would be glad to mail you descriptive literature containing the basic facts and specifications. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.

Now! Tests prove

CONTOUR-WELDED* STAINLESS TUBING

gives products better protection against contamination

This tubing is smoother inside – so there's less danger of product incrustation. And this means better protection against contamination. Not only that, a smoother surface also ensures greater resistance to corrosion and longer fatigue life.

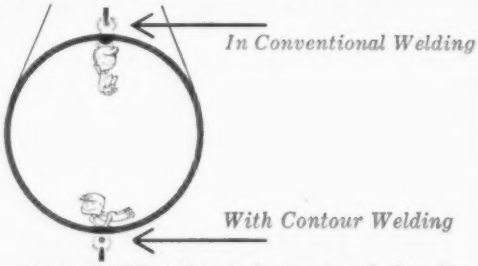
Here's why TRENTWELD® tubing, made by the exclusive *Contour-Weld* process, is smoother than any other tubing:

First, it's smoother than seamless tubing because it's formed from uniformly rolled strip steel whereas seamless is extruded from a billet.

Second, it's smoother than other welded tubing because the Trent-patented *Contour-Weld* process virtually eliminates the weld bead.

But get full details on why smoother tubing surfaces are vital. Send for the free 48-page "Trentweld Manual." It contains complete data on *Contour-Welded* tubing in stainless and high alloy steels, titanium, zirconium, zircalloy and Hastelloy†, in sizes from ⅛" to 40" O.D. Write: Trent Tube Company, Box 2518, Pittsburgh, Pa.

†Trademark Haynes Stellite Co.



In **CONVENTIONAL WELDING** of tubes, gravity pulls the molten metal down to form a bead that is difficult to remove by cold working. And cold working may lead to undercuts, focal points for fatigue cracks and corrosive attacks. Cleaning becomes difficult.

* With **CONTOUR-WELDING** the tube is welded at the bottom. Gravity still pulls the molten metal down inside the tube, but now the weld area corresponds to the contour of the tube. There's virtually no weld bulge on the inside surface. And even on the O.D., the weld seam more closely conforms to the contour of the tubing.

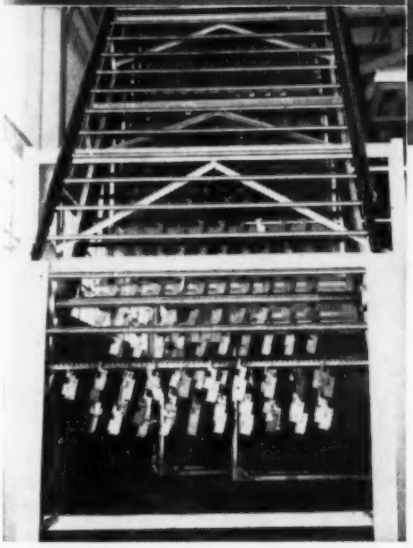
CONTOUR TRENTWELD®

stainless and high alloy pipe and tubing

TRENT TUBE COMPANY

Subsidiary of Crucible Steel Company of America • GENERAL OFFICES: East Troy, Wisc. • MILLS: East Troy, Wisc.; Fullerton, Calif.

FINISHING SYSTEMS...



The 8 Ft. wide Crossbar Conveyor carries a variety of products and a great mass of small parts through all processing units of the Dip Coating System. The Crossbars in the Conveyor are designed for a work load of 250 lbs.

Complete Mahon Installation Provides Compact Facilities for DIP COATING and SPRAY PAINTING in CUTLER-HAMMER'S Lincoln, Illinois Plant!

In this unique finishing system, the greater part of which is located on the roof, Mahon engineers have employed what is probably the longest continuous crossbar conveyor ever designed into equipment of this type.

The painting enclosure shown above is inside the large electrical plant. This enclosure is divided into two sections, one of which has a paint mixing room on the ground floor and paint Dip Tanks on a mezzanine floor above. The other section houses two Spray Booths and a Batch-Type Finish Baking Oven. The conveyorized, Five-Stage Metal Cleaning and Rust Proofing Machine, Dry-Off Oven, Finish Baking Oven and the Filtered Air Supply Equipment are housed in one enclosure on the roof.

This is the third complete finishing system installed by Mahon in Cutler-Hammer Plants across the country.

If you have a finishing problem, or are contemplating new finishing equipment, you, too, will want to discuss methods, equipment requirements and possible production layouts with Mahon engineers . . . you'll find them better qualified to advise you, and better qualified to do the initial planning and engineering which is so important in specially designed equipment of this type.

See Sweet's Plant Engineering File for Information, or Write for Catalogue A-659

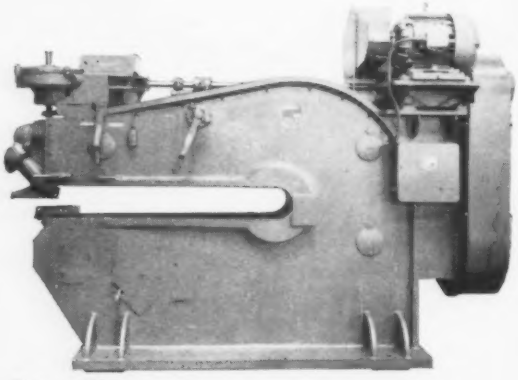
THE R. C. MAHON COMPANY • Detroit 34, Michigan

SALES-ENGINEERING OFFICES in DETROIT, NEW YORK and CHICAGO

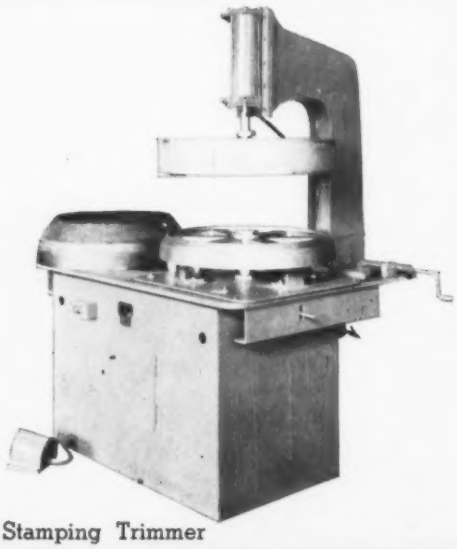
. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!

MAHON

New Additions To The BEATTY Line of Metalworking Equipment

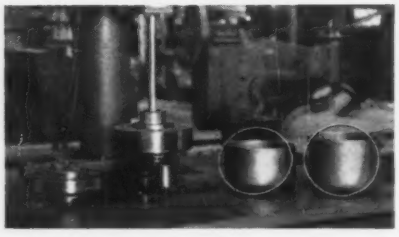


Rotary Shear

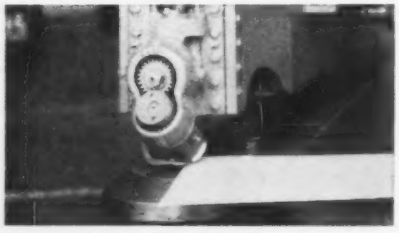


Stamping Trimmer

BEATTY-QUICKWORK



Beatty-Quickwork trimmer trims flash from almost any kind of stamping in a single plane.



Beatty-Quickwork rotary shear cuts, bevels, circles, flanges and joggles plate and sheet metal up to 1" mild steel.

ROTARY SHEARS and STAMPING TRIMMERS

QUICKWORK — leading name in precision machine tools — Rotary Shears and Stamping Trimmers — is now a part of the famous BEATTY family of metalworking equipment. This new acquisition (from the Whiting Corporation, Harvey, Ill.) is an important step in bringing you a more complete line of cost-saving, high-production metalworking equipment from one reliable source — BEATTY. The BEATTY-QUICKWORK Rotary Shears and Stamping Trimmers are distributed through Quickwork and Beatty dealers. We invite your inquiry concerning Beatty-Quickwork and other Beatty equipment — presses, punches, shears and bulldozers — which can help you cut costs; solve your metalworking problems economically, faster and with the precision for which Beatty and Quickwork are well known.

BEATTY-QUICKWORK

Division of BEATTY MACHINE & MFG. CO.

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Now, one grade of trichlor does both

Whether you clean a rocket or degrease a gear, you can now use Nialk® metal degreasing grade trichlorethylene as your cleaning agent.

This grade of Nialk meets rigid government and industry standards for solvents used to clean rocket and missile components. It leaves little or no residue when it evaporates. At the same time, it keeps the above-average chemical stability needed for vapor degreasing.

The savings in this twofold use of one grade of trichlor can be readily seen. Now you can:

Cut your inventory and make your buying easier.

Avoid errors. No one can pick the wrong drum when you're buying just one grade of trichlor.

Make your materials handling easier.

Help end your disposal problems. Usually you can use the Nialk trichlor from your flushing operation in your vapor degreasing operation without distilling, or the solvent can be recovered and used again and again.

STABILITY WITH psp

You get **psp** too, when you ask for Nialk trichlorethylene. **psp** is "**p**ermanent **s**taying **p**ower," the ability of the stabilizer to keep from wearing out.

You can get more information on this metal degreasing grade of Nialk trichlor. Just write for specifications and data.

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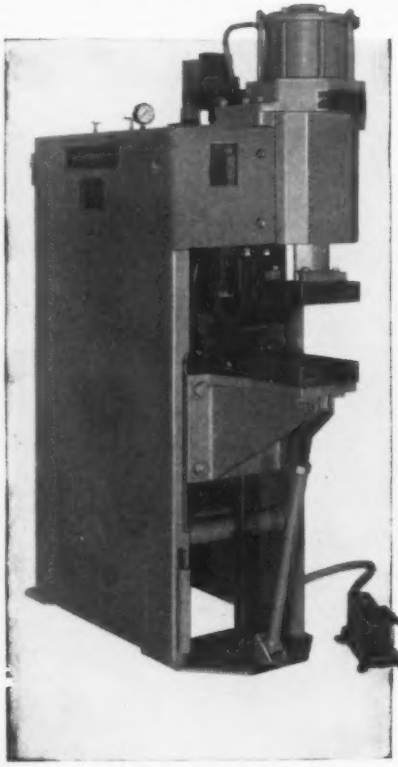
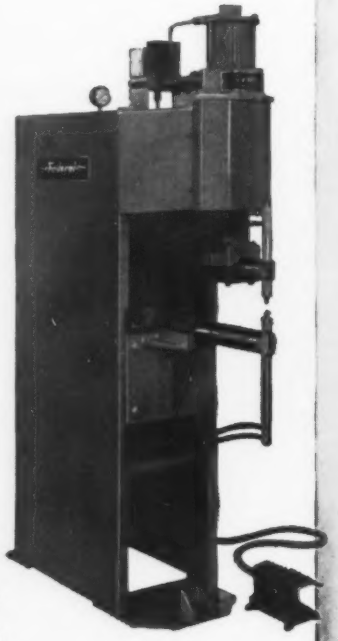
FEDERAL'S NEW TRIM-LINE PRESS WELDERS

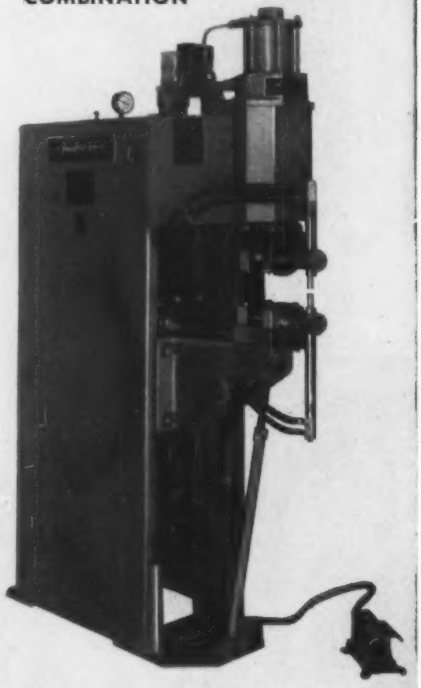
PROJECTION



SPOT



COMBINATION



Available from stock in four sizes in capacities of 30 to 500 K.V.A.

Completely new . . . these advanced design trim-line press welders will give you maximum production in a minimum floor area. What's more their compact, simplified design assures easier operation, less maintenance and ready accessibility.

Designed and built by Federal, one of the largest and most experienced resistance welder manufacturers, these new welders are available from stock as spot welders with horns, projection welders with platens, or combination spot and projection welders. Each type is available in a full range of standard throat depths, welding forces and transformer sizes.

Many standard automatic welding attachments are available to increase production with these standard machines.

Listed below are some of the features. For more information get in touch with the Federal representative nearest you. Ask for Bulletin P-59 and Special Tooling Bulletin AWA-59.

COMPLETELY ALL NEW DESIGN FEATURING:

- **New One Piece Frame** . . . stronger, less floor area, greater accessibility.
- **New Anti-Friction Slide** . . . hardened and ground slideweighs —eight anti-friction roller mount gives maximum stability —permanently lubricated rollers—simple adjustment.
- **New Steel and Copper Lower Arm** . . . minimum deflection—easier to adapt for special tooling.
- **Stock Models** . . . all components built for stock, quick delivery.
- **No Price Increase** . . . superior design at low cost.

Federal / Warco

THE FEDERAL MACHINE AND WELDER CO. • WARREN, OHIO

AFFILIATED WITH BERKELEY-DAVIS, INC., DANVILLE, ILLINOIS, MANUFACTURERS OF AUTOMATIC ARC WELDING EQUIPMENT

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FINE
CARS

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if cost reduction is your problem

value analysis *dictates*

NATIONAL HTM CASTINGS

To make or buy — to cast, forge or fabricate — that is often the question.

Before you decide, look into the advantages of National HTM (pearlitic malleable) castings over other methods of forming.

Among the great advantages of National HTM castings are closer as-cast tolerances that often eliminate machining operations . . . excellent response to subsequent hardening operations, either induction or flame . . . easy machinability on your present equipment . . . high ultimate strength . . . excellent non-seizing bearing qualities . . . air or liquid quenching . . . ability to be smooth-finished.

Yes, Value Analysis often makes the use of *National HTM castings a must.* And remember National HTM castings can be precision cast by the shell mold, CO_2 or green sand methods. Production costs tumble . . . performance and salability of your product spurt — with National HTM (pearlitic malleable) castings.

AA-9358

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Established 1868 — *Cleveland 6, Ohio*

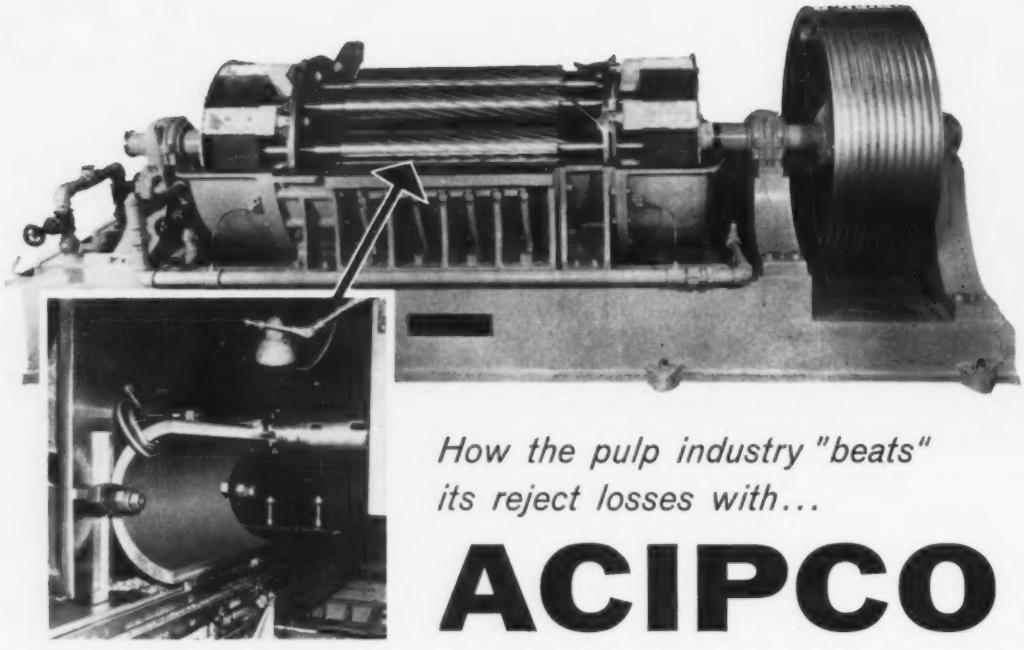
The nation's largest independent producer of malleable and pearlitic malleable

MEMBER

MALLEABLE CASTINGS COUNCIL

Important Physical Properties	
Brinell	163 to 302*
Yield, psi	48,000 to 85,000*
Ultimate, psi	70,000 to 110,000*
Elongation, %	7 to 2*

**Depending upon grade*



How the pulp industry "beats" its reject losses with...

ACIPCO

stainless steel liners

In Canada, Europe, South America, Japan—as well as in this nation's largest paper mills—refiners manufactured by Anton J. Haug are saving more than 700 tons of good groundwood, sulphite and kraft rejects *each day*. This refined stock is marketed at the same price as virgin pulp—and the annual savings in wood alone is more than $7 million!

ACIPCO plays an important part in reject recovery by furnishing the stainless steel lining which goes inside the main casing of the Haug refiner. The lining, statically cast to Haug's exacting specifications, fits inside a stationary cylindrical shell.

Stock, entering at one end, travels through the machine in a helical path and is *repeatedly subjected to the pressure of high speed rolls which crush it against the liners.*

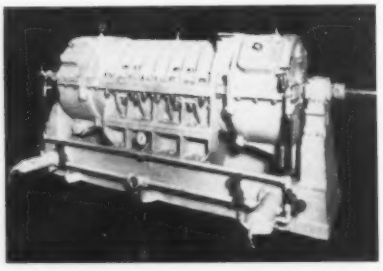
In special shapes such as this, as well as centrifugally spun steel tubes, ACIPCO castings stand up . . . under the longest, toughest assignments. If *your* application is a special one, it will be worthwhile for you to investigate ACIPCO's facilities for casting, heat treating, machining, fabricating and testing.

Stainless steel, carbon steel, alloy iron or special analyses—versatile ACIPCO tubes are made to solve your specific tubular metal problem. Call ACIPCO today for complete information—or for expert technical assistance.

Size Range Lengths up to 410" have been produced to meet modern machinery requirements. OD's from 2.25" to 50"; wall thicknesses from .25" to 4"

Analyses All alloy grades in steel and cast iron, including heat and corrosion resistant stainless steel, plain carbon steel and special analyses.

Finished As cast, rough machined, or finished machined, including honing. Complete welding and machine shop facilities for fabrication.



Reject recovery with Anton J. Haug refiners is saving paper mills more than $7 million per year in wood alone! ACIPCO *furnishes tough, durable, stainless steel liners which go inside the main casings of the machines.*

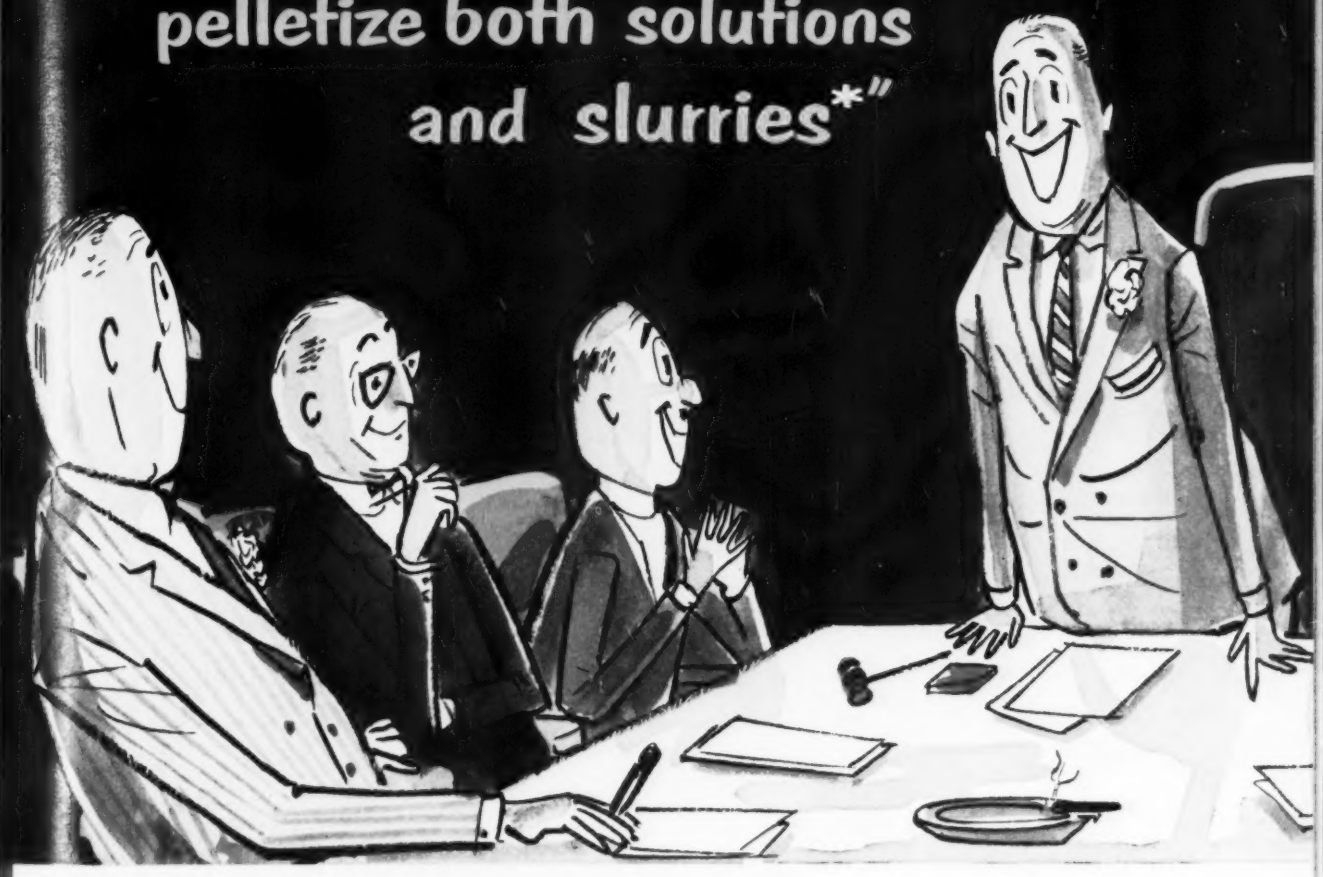
Special Products Division

AMERICAN

CAST IRON PIPE CO.

PHONE AL 1-8121, EXT. 285 • BIRMINGHAM, ALA.

"Gentlemen...the new C+I spherodizer process can pelletize both solutions and slurries*"



- **Ammonium Nitrate Phosphate** *(26-26-0)*
- **Ammonium Phosphate** *(21-53-0)*
- **Ammonium Nitrate** *(from 83% solution)*
- **Urea** *(from 70% solution)*
- **Complex Fertilizer** *(all ratios and grades)*
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- **Ammonium Nitrate Limestone**

C&I's new SPHERODIZER PROCESS† can pelletize solutions and slurries for the production of high analysis fertilizer without utilizing prilling or other costly granulating methods. Outstanding advantages of the Spherodizer Process are: comparatively low capital investment in plant; a recycle rate less than 20%; exceptional flexibility in that the process can spherodize any slurry and low concentrated solutions. The Spherodizer Process produces a uniform, homogenous, and symmetrical pellet in any desired size range that can be stored in bulk or bags. Plants are available in any desired capacity.

Let our free, illustrated brochure give you all the details, graphically. Product samples on request.

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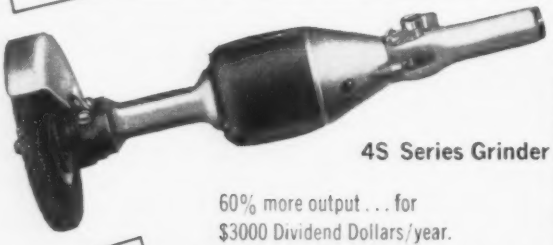

4S Series Grinder

60% more output . . . for $3000 Dividend Dollars/year.

NEW

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25% more output . . . for $1250 Dividend Dollars/year.

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25% more output . . . for $1250 Dividend Dollars/year.

NEW

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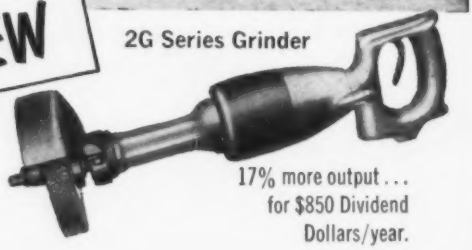

17% more output . . . for $850 Dividend Dollars/year.

If your operators are using older model grinders, you can increase their man-hour productivity by as much as $3000 Payroll Dollars in one year, just by replacing the older tools with one of the new I-R designs.

Multiply these *Annual Dividends* by the number of grinder operators in your plant, and you can see why management today is taking a new look at portable tool operations.

There's a fast, easy way to calculate the amount of *Dividend on Payroll Dollars* these new I-R grinders can help you earn in just one year—without adding to your present payroll.

It's yours without obligation. To get it, call your I-R AIRengineer today. Or write Ingersoll-Rand, 11 Broadway, New York 4, N. Y.

Ingersoll-Rand

Tools plus AIRengineering increase output per man

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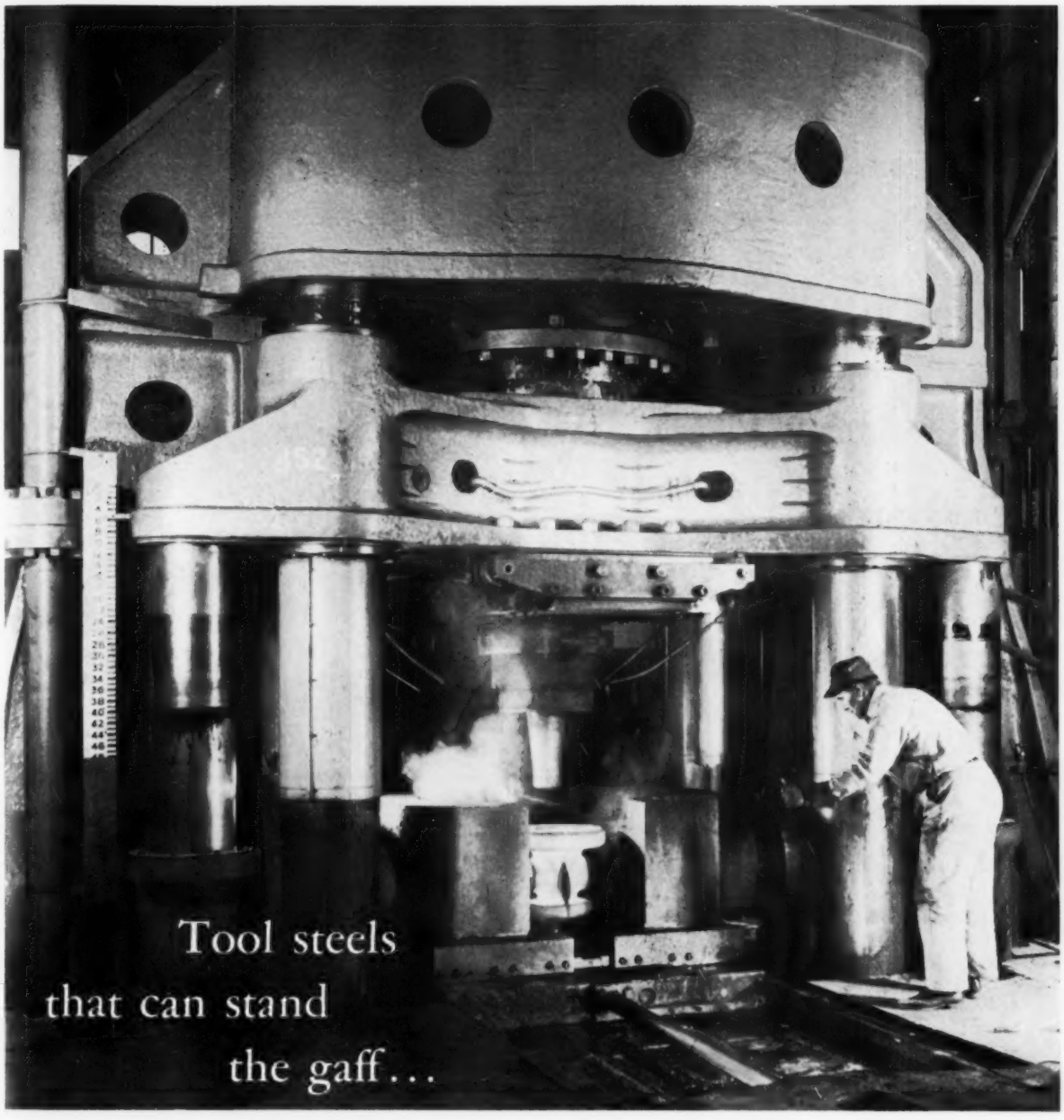

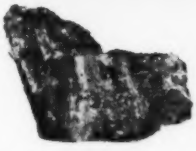

...depend on Vancoram Vanadium! No other alloying element has proved so dependable and versatile for use in tool and die steels, as well as other specialty steels, irons and metals where long life and top performance are essential. Vanadium controls grain size, improves strength and toughness, and provides excellent cutting and wearing characteristics. Regular constructional steels and irons, deep drawing steels, large forgings, and steel and iron castings greatly benefit from the addition of just a small amount of vanadium. Let your nearest VCA office tell you more about Vancoram vanadium products . . . and their many advantages and economies. Vanadium Corporation of America, 420 Lexington Avenue, New York 17, N. Y. • Chicago • Cleveland • Detroit • Pittsburgh

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And little wonder... for Uddeholm stainless steels give you the corrosion resistance you need, without sacrificing other performance requirements. Uddeholm stainless strip steels, for example, can provide exceptional fatigue resistance, extremely sharp edges, and other properties you might expect only from high carbon strip steel. As a result, Uddeholm stainless can often replace carbon steel — eliminating corrosion problems, or the need to use chrome plated or copper alloy parts. Uddeholm's Cold Drawn Stainless Wire provides similar advantages. Both strip steel and wire are available in many stainless grades. The three most effective types of hardened and tempered stainless for producing parts or springs are:

UHB-731 For applications requiring good toughness and good blanking properties even on fairly thick material.

UHB-716 For applications requiring high hardness combined with good elasticity and edge sharpness.

AEB Primarily a cutlery steel for razor blades, surgical steel and other products requiring maximum edge sharpness.

UDDEHOLM Cold Drawn Stainless Steel Wire
is described in a new, informative and well-illustrated booklet that covers types, properties and applications.

UDDEHOLM Martensitic Stainless Strip Steel
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In All Uddeholm Strip Steels You Are Guaranteed:
Maximum Fatigue Strength • Accurate Dimensions • Fine Surface Finish • Excellent Wear Resistance

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COLD ROLLED SPRING STEELS

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HERE'S YOUR MOST COMPLETE BUYING GUIDE for GRANITE SURFACE PLATES AND ACCESSORIES

This new buying guide contains a selector chart listing 432 surface plates of various sizes, ledges and accuracies. It also explains the meaning of DoALL surface plate accuracy and contains a complete listing of plates made in exact accordance with government specifications. The fully illustrated guide also describes DoALL's black granite accessory gages: angle plates, straightedges, parallels, master flats, magnetic chuck platforms, deburring stones and plate stands. DoALL's resurfacing and fixturing service is also explained. Get your free copy from your local DoALL Sales-Service Store.

30-DAY TRIAL OFFER

You can test DoALL Black Granite Surface Plates in your own plant—without cost or obligation. DoALL will send you a surface plate in any standard size up to 24″x36″, freight prepaid, for a 30-day free trial. Call your local DoALL Store today.

DoALL Doubles Plate Accuracy — No Price Increase

DoALL Black Granite Gaging Products go far beyond usual tolerances—beyond federal specifications. Now DoALL produces its surface plates and accessories to *Unilateral Tolerance Limits*. With this standard, DoALL delivers twice the accuracy for the same money or less! DoALL Black Granite Surface Plates are available in three accuracies—all under the *Unilateral Tolerance Limits*.

Laboratory Grade (AA).....±.000025″
Inspection Grade (A).....±.000050″
Shop Grade (B).....±.000100″

Purchasers of DoALL surface plates and accessories can put their trust in DoALL's reputation as a top-quality gage producer. So-called "bargain" plates at reduced prices reflect the lack of craftsmanship and accuracy. DoALL's use of the finest black granite coupled with its manufacturing skill and know-how assures users of plates and accessories made exactly to their accuracy requirements.

Call your local DoALL Sales Engineer. He will be glad to give personal attention to your gaging problems.

BG-4

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The DoALL Company, Des Plaines, Illinois

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New High-Strength Material Extends Superior Line of Stainless Steel Tubing Analyses

PH 15-7 Mo, a new precipitation-hardening stainless steel analysis, possesses excellent mechanical properties at room temperature, outstanding ones at elevated temperatures. In addition, it is readily fabricated in the annealed condition, exhibits good corrosion resistance characteristics, can be hardened by heat treatment with minimum distortion.

Tubing of this new analysis is recommended for aircraft structural parts, studs and bushings, Bourdon springs and torque tubes in instrumentation, tubular springs, and hydraulic lines where severe bending and forming are required. It is available in WELDRAWN® form in size range from .012 through 1.125 in. OD.

In addition to PH 15-7 Mo, Superior offers the widest variety of analyses in the small-diameter tubing industry—over 120. This range permits you to specify the right one for your particular application. For complete information about PH 15-7 Mo and other analyses available for your needs, write Superior Tube Company, 2004 Germantown Ave., Norristown, Pa. *Reg. U.S. Pat. Off., Armco Steel Corp.

Superior Tube

The big name in small tubing

NORRISTOWN, PA.

All analyses .010 in. to ⅜ in. OD—certain analyses in light walls up to 2½ in. OD

West Coast: Pacific Tube Company, Los Angeles, California • FIRST STEEL TUBE MILL IN THE WEST

Fyre-Free Clothing

AO Fyre-Free Clothing is recommended for Spot Welding, Drop Forging, Light Metal Splash and similar exposures.

AO's New Line of "FYRE-FREE" CLOTHING

Permanent-Type Flameproofing—takes laundering after laundering or dry cleaning without loss of flameproofing properties

Here's a new line of protective, comfortable work clothing which fills a real need of many workers (and safety directors and industrial purchasing departments).

American Optical "Fyre-Free" Clothing combines the soft feel of an untreated material with the protection of permanent-type flameproofing. The fabric is 100% cotton cloth weighing approximately 11 to 11½ ounces per square yard finished. It has good tensile strength in both warp and fill . . . is long lasting . . . mildew resistant . . . and does not deteriorate in damp climates or operations.

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Available in a complete line of Sleeves, Cape Sleeves with or without Bibs, Regular and Split Leg Aprons, Overalls, Coats, Coveralls, Hip Leggings and Pants. Your nearest American Optical Safety Products Representative can supply you.

Always insist on AO Trademarked Safety Products

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Here's information on a new plastic chrome ore from Porter's Pascagoula Plant

Plastikrom

HIGH RESISTANCE TO BASIC SLAGS

HIGH AIR SETTING STRENGTH

HIGH REFRACTORINESS-LOW SHRINKAGE

PROPER WORKABILITY-READY TO USE

Technical men know there is a *difference* in plastic chrome ore refractories . . . some chrome ore refractories resist heat, shrinkage and deformation, others are less satisfactory. The secret: *crystalline structure of chrome ore.*

Some ores, because of their crystalline structure, are more *plastic*. Less desirable ores require greater additions of clay to produce a plastic material . . . under high-temperature conditions, the clay fluxes the chrome and the refractory fails.

PLASTIKROM from Porter's Pascagoula Plant is made from select ores having a crystalline structure that develops a natural plasticity. Only minor clay additives required. PLASTIKROM is processed and manufactured in the industry's newest, most modern facilities, to highest quality standards.

For the finest, high-grade plastic chrome ore refractories . . . specify PORTER PLASTIKROM. Complete information available from: *Refractories Division, H. K. Porter Company, Inc., Porter Building, Pittsburgh 19, Pa.*

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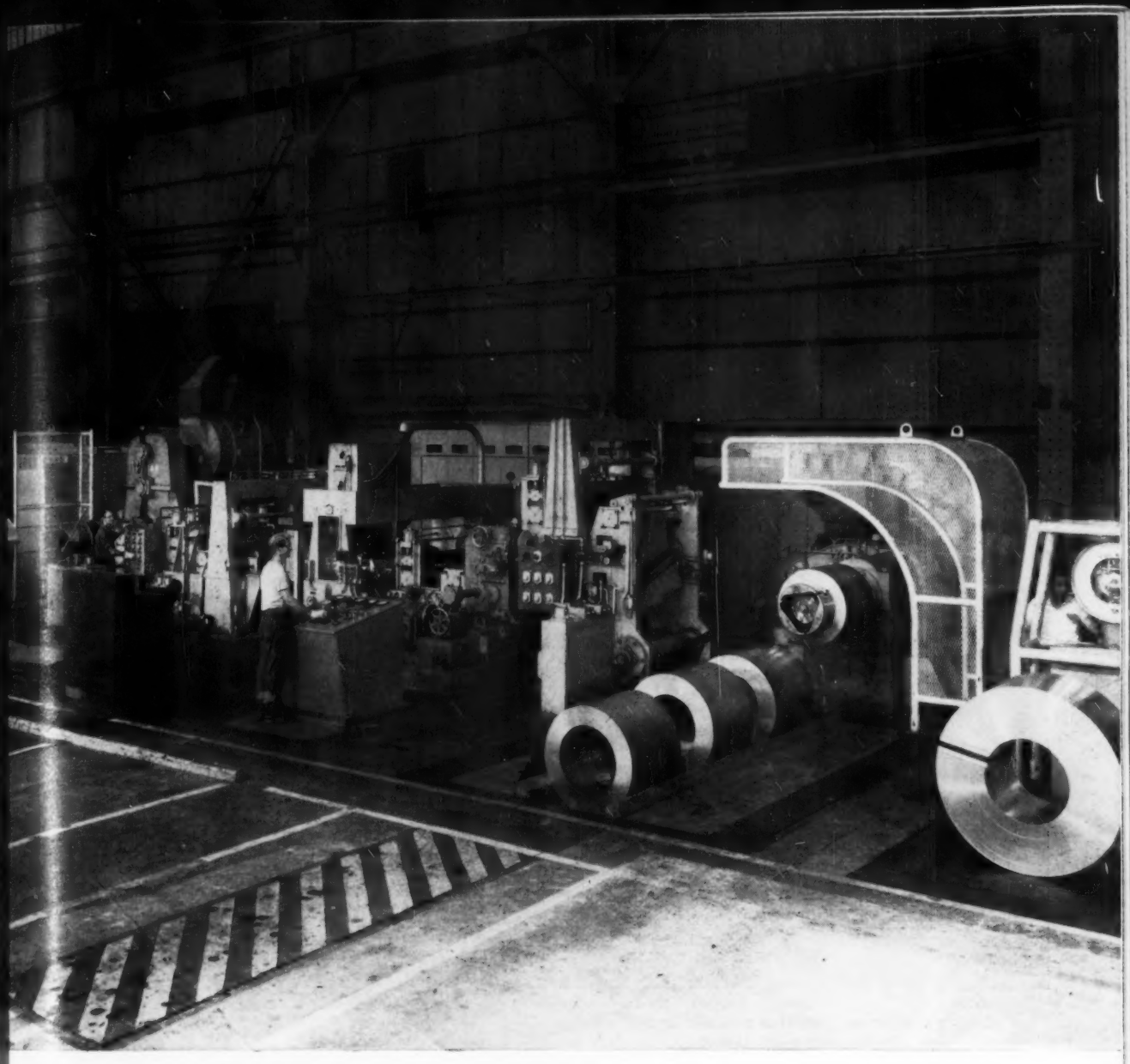
PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; Copper and Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepcoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD.



Wean coil preparation lines operate at 4000 fpm or more . . .

With Wean coil preparation equipment, you add materially to the efficiency of your tinning line operations—an important consideration in view of the increasing demand for tin plate in coil form.

Side trimmed coils up to 90" O.D. are produced for the electrolytic tinning lines, or smaller coils (see photo) are made for direct shipment to the customer as oiled black plate or other tin plate products.

As the established leaders in continuous steel processing equipment, Wean designs and builds coil preparation lines to meet any requirement. Wean *creative engineering* can benefit you on your next finishing line project.

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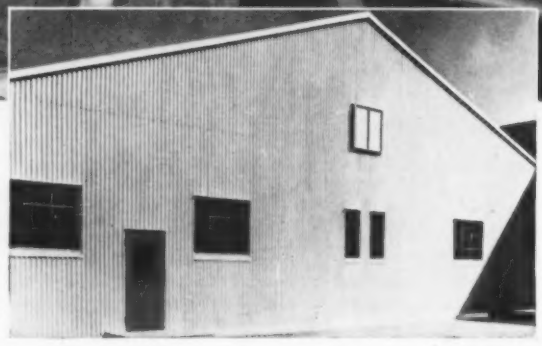
STEELWELD SHEAR

Operates 16 Hours a Day

Cuts Components for Prefabricated Buildings

Cutting and slitting operations normally keep this Steelweld Shear busy 16 hours a day. It is equipped with Steelweld's popular Micro-Set Knife Adjustment. This permits adjusting the knife clearance to suit the thickness of metal being cut in the matter of seconds. Thus, the finest cuts are assured for every shearing job.



A recent Pascoe Building.

RAPIDLY forging ahead in the prefabricated steel building field, Pascoe Steel Corporation, Pomona, California, has found its Steelweld Shear to be an extremely important factor in maintaining a steady rate of production. A large amount of shearing is required to fabricate several hundred tons of steel per month.

The Shear is normally operated 16 hours a day. It is used for cutting web plates for building columns, rafters and many other building components. About 20 hours a week it is used for slitting. The machine has functioned with very little maintenance. In nearly three years of service, the clutch has never required adjustment.

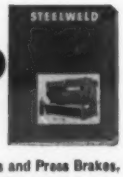
For the very latest in shears and brakes, mechanically or hydraulically operated, be sure to see what Steelweld has to offer.

Write for free copy of catalog No. 2011

STEELWELD

Mechanical and Hydraulic

SHEARS PIVOTED BLADE



Steelweld Machinery includes: Mechanical & Hydraulic Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

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Above $4000 yearly savings...

excellent accuracy, duplicating to less than .001". . . clean front and ease of conversion to regular or Copymatic operation are outstanding . . . removing 15 to 30% more metal than our best (lathes) — twice that of some.

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Saving up

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ELECTRONICS MANUFACTURER

Production increased 200%

Shown is 90° COPYMATIC Lathe with 4-Way Power Rapid Traverse, (optional extra). 45° COPYMATIC and Powershift Preselector headstock also available.

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LOOK AT LODGE & SHIPLEY FIRST!

More production at lower cost is the answer to constant upward pressure on prices. Savings proved in Lodge & Shipley case histories* show the wisdom of investigating *and* buying a Lodge & Shipley POWERTURN Lathe as a profitable replacement.

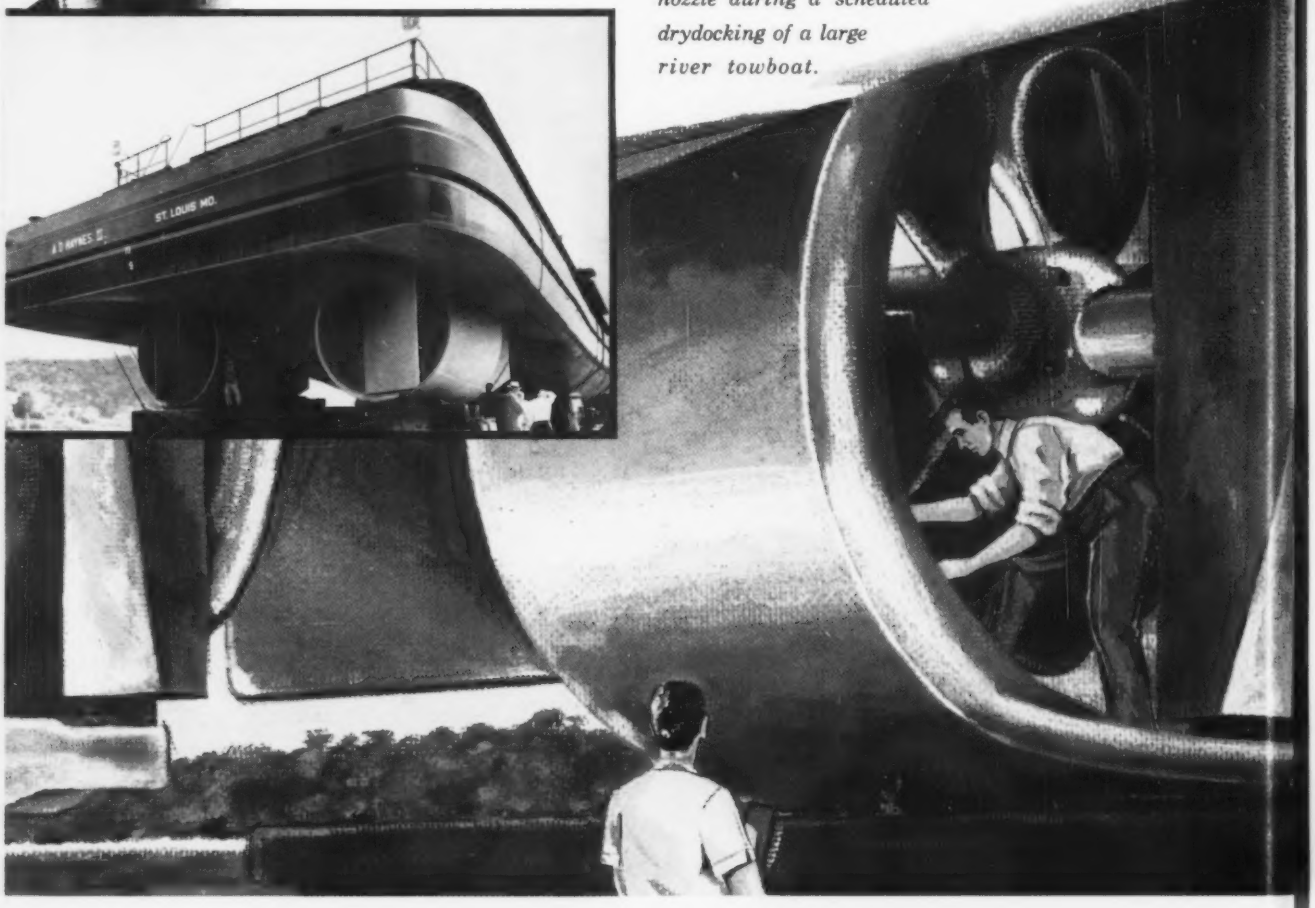
Production requirements change. The lathe purchased just a short time ago may not be adequate . . . judged by today's production, accuracy and economic standards. Details in Sweet's Machine Tool File; contact local representative through Yellow Pages or write direct for case histories and Bulletin No. L-103:

The Lodge & Shipley Co., 3073 Colerain Avenue, Cincinnati 25, Ohio.

**Names and details on request.*

Lodge & Shipley

...where industrial progress is cast in steel



General Steel service engineers inspect a recently developed cast steel Kort nozzle during a scheduled drydocking of a large river towboat.

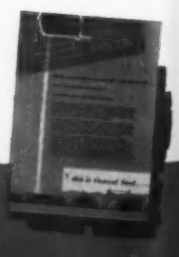
FIELD SERVICE...PERSONALIZED PRODUCT ATTENTION

Attention to detail . . . inspection in the plant . . . assistance with assembly . . . inspection again while in use . . . and most important of all, service when you need it . . . these are all parts of General Steel's complete service.

When unpredictable events occur, General Steel service engineers are available to you to help return your units to service with minimum delay.

Representatives from every department . . . engineering, manufacturing, sales . . . are available to work closely with you from concept—to casting—to completed product. Let us show you the benefits of this integrated service in helping you plan components of your products . . . in cast steel, cast weld or composite structures.

Write for folder **How General Steel Castings Can Improve Product Design and Performance.** General Steel Castings, Station 201 Granite City, Illinois



GENERAL STEEL CASTINGS

GRANITE CITY, ILL. • EDDYSTONE, PA. • AVONMORE, PA.

UDYLITE GOES ALL OUT . . .

to make your 1959 AES Convention memorable

THIS IS A DOUBLE INVITATION . . . BE OUR GUEST

Jeanne Darr, singing comedienne

AT THE CONVENTION . . .

JOIN US AT THE UDYLITE HOSPITALITY CENTER for Cocktails on Monday, Tuesday and Thursday, June 15, 16 and 18 from four to six p.m. . . . Michigan Room of the Statler Hilton Hotel, Detroit. Entertainment will feature Jeanne Darr and Elena Santa.

BE SURE YOU DO NOT MISS THE UDYLITE-AES BALL . . .

in the beautiful Terrace Room of the Statler Hilton, Thursday evening June 18, 10 P.M. to 2 A.M. Rollicking entertainment will be supplied by the Fenby-Carr quintet known across the country as the Singing Schoolteachers. BE THERE!

Fenby—Carr quintet

AT THE EXPOSITION . . .

See Udylite's exciting and unusual display, a truly unique presentation of the most complete and advanced developments in equipment, supplied and services . . . graphically displayed in a manner that will put you "right on top" of the metal finishing picture. Here presented in a striking manner and full of surprises is an entire industry—on Parade.

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and **EXPOSITION** for 1959
DETROIT, MICHIGAN
JUNE 15 THRU 19
STATLER HILTON HOTEL
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Mr. Executive:

Learn about the latest developments in modern metal finishing . . . see *Udylite!*

P. S. Make sure your staff sees this, too.

world's largest plating supplier

the **udylite** corporation

detroit 11, michigan

To get highest possible quality. Ta

Lewis Walker, president of Talon, Inc., left, discusses Shu-Lok with David Rae, general manager of the Shu-Lok Fastener Division.

ity. Talon, Inc. starts with

"We must have the best steel"—says Carl M. Joslyn, plant manager of Shu-Lok Fastener Division, shown above with David Dibbell, Shu-Lok sales manager.

Quality Steel

Sharon supplies prime stainless for Talon's remarkable Shu-Lok

"The greatest thing that's happened to shoes since we killed the high button", say shoemakers. "A godsend"—agree mothers of little boys everywhere. Businessmen and athletes, too, are outspoken when describing the remarkable new Shu-Lok developed by Talon, Inc.

The Shu-Lok is an ingenious metal slide that "laces" shoes to the wearer's desired tightness instantly by simply pressing a small lever to the instep. Like all Talon creations the Shu-Lok is a highly perfected top quality product designed and built to provide years of service.

To make doubly sure it would do the job, Talon's engineering and production people decided to fabricate Shu-Lok of stainless steel. To make certain of the finest stainless, they came to a leading stainless producer, *Sharon Steel Corporation, Sharon, Pa.*

PHOTOS BY KARSH OF OTTAWA

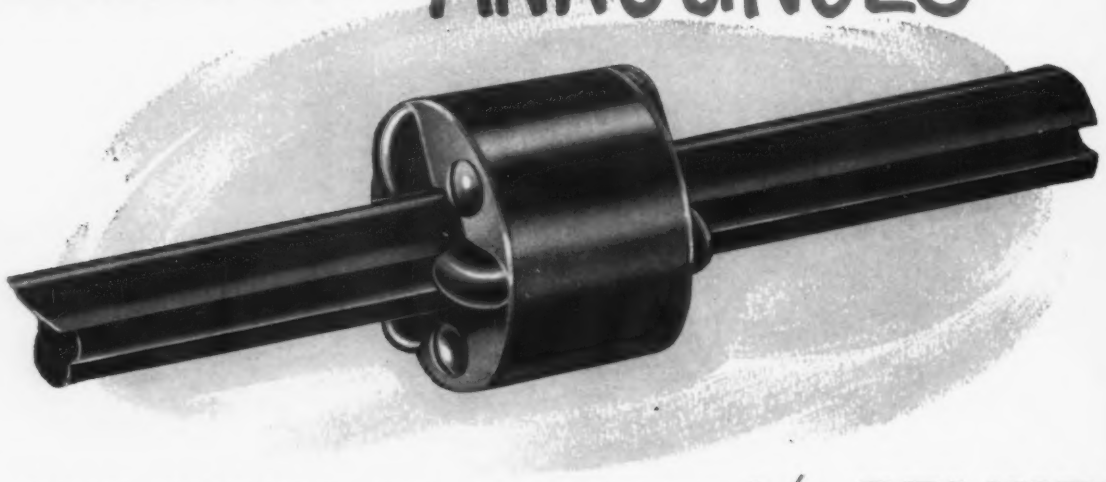
"Supplier reliability is important"—F. V. Hanaway, manager of purchases, Talon, Inc. Here Mr. Hanaway, center, talks steel with Sharon salesman Gordon Garrett and Talon steel buyer Carl Parson.

"Steel quality dictates design"—Thane E. Hawkins, chief engineer, Shu-Lok Fastener Division.

SHARON *Quality* **STEEL**

SHARONSTEEL

SAGINAW ANNOUNCES



A NEW SERIES OF STANDARD b/b SPLINES AT LESS THAN HALF FORMER COST!

Average 40 TIMES Lower Coefficient of Friction than Conventional Sliding Splines— Far Better Performance at Comparable Cost

Good news for machine tool, aircraft and other designers! Standardization and volume production economies now enable you to take full advantage of this revolutionary ball/bearing Spline, built on the same gliding ball principle pioneered by the famous Saginaw b/b Screw.

Wherever easy linear movement is required under high torque load, Saginaw Standard b/b Splines offer:

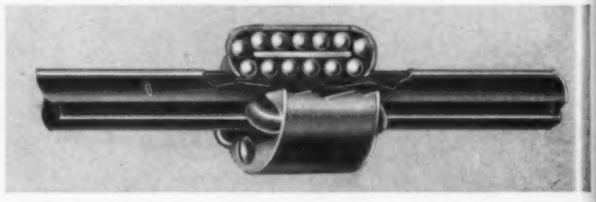
- ***Freedom from Frictional Heat*** • ***Minimum Radial Lash*** • ***Long, Trouble-free Service Life***

HIGH PRECISION COMMERCIAL QUALITY

These new low-cost Standard b/b Splines are high commercial quality with excellent precision and service life, suitable for all but the most critical applications. Yet they cost about the same as high-friction splines.

TRANSMIT OR RESTRAIN HIGH TORQUE LOADS NO OTHER SPLINE CAN HANDLE

Standard b/b Splines are so friction-free that they permit previously impossible applications under very heavy torque loads, where the effort required to slide conventional splines would exceed the structural strength of members. They literally let you achieve the "impossible"!



Saginaw b/b Splines transmit or restrain high torque loads with far less friction because mating surfaces *glide* on rolling balls instead of *sliding* back and forth. Steel balls recirculate in closed circuits formed by mating longitudinal raceways spaced around the circumference of inner and outer parts.

6 STANDARD SIZES

.375 .625 1.000 1.500 2.000 2.500

Can be fitted with integral gears, clutch dogs, bearing and sprocket seats or other attachments for use with electrical, hydraulic or pneumatic units.

SEND TODAY FOR FREE BALL BEARING SCREW AND SPLINE HANDBOOK
or see our section in Sweet's Product Design file.

Saginaw ball bearing Screws & Splines

SAGINAW STEERING GEAR DIVISION OF GENERAL MOTORS CORPORATION, SAGINAW, MICHIGAN

WORLD'S LARGEST PRODUCER OF BALL/BEARING SCREWS AND SPLINES

This lightweight "No Charge" spool is typical of Roebling's modern packaging methods that save customers time and money.

Are You Getting What You Pay For?

When you pay for HIGH QUALITY high-carbon wire, you want to be sure you get it. You do, when it is supplied by Roebling.

It is unsurpassed in quality, consistently true to specifications, and absolutely uniform in gauge. Hundreds of manufacturers attest to this fact . . . the qualities that they *pay* for—they *get* in Roebling high-carbon wire. The length of our relationship with customers proves it.

We'll be glad to show you what we mean. For information on superior high-carbon wire or cold rolled strip, write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities—Subsidiary of The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it

Philadelphia Gear announces...

a major breakthrough to new standards in precision grinding of speed reducer gearing... *So advanced* that conventional standards of accuracy have suddenly become out-of-date. *So significant* that you can solve drive problems you could never solve before... because you get engineering advantages that have never been available before.

IMPROVED ACCURACY

For the first time, standard commercial speed reducers are available with gearing of master gear quality.

LONGER LIFE

Extreme accuracy of profiles, profile spacing and surface finish completely eliminates "running in" periods and resulting wear on gearing.

REDUCED BACKLASH

Precision ground gearing means reduced backlash for reversing drives... plus uniform backlash where precision of movement is important.

100% INTERCHANGEABILITY

Duplicate units or spares can be installed with original manufacturing tolerances duplicated exactly.

SPACE AND WEIGHT SAVINGS

Use of harder materials plus reduced load factors save weight and space without sacrificing performance characteristics.

REDUCED VIBRATION

Reduced tooth to tooth errors, accumulated pitch errors and total composite errors give smoother contact.

HIGHER SPEEDS

Dynamic load factors are materially reduced. Reducers can operate at higher speeds . . . have increased load carrying capacity.

REDUCED NOISE

For any application where low sound levels are important, gearing noise is no longer a controlling factor.

IMPROVE YOUR PRODUCT

Philadelphia precision gear drives may give your product the years-ahead competitive edge you've been looking for.

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philadelphia gear drives

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Offices in all Principal Cities • Virginia Gear & Machine Corp., Lynchburg, Va.

INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID MIXERS • FLEXIBLE COUPLINGS

STEEL DEMAND is exceeding all expectations. A new surge of orders for third quarter delivery has hit the mills. Industry leaders are convinced that the demand is real--and not entirely the result of hedging against a steel strike.

STEEL LABOR OUTLOOK is worsening. Both sides are still adamant. And steel industry leaders talk as if they mean it this time. Barring a miracle, or direct Government intervention, it looks as though steel workers will "hit the bricks" on June 30.

NEW HIGHS IN BUSINESS are looked for by Commerce Secretary Strauss. "All signs point to an extension of the rise in gross national product in the current quarter," says Mr. Strauss.

A NEW MONTHLY HIGH in building awards was set in April, according to F. W. Dodge Corp., the building authority. Dodge reports that April contracts rose to $3.8 billion in April, compared with $3.3 billion in March, also a record.

STEEL AUTO INVENTORIES continue to rise despite new car sales of more than 500,000 units for the past two months. They are now nearing the all-time high of 903,789 reached March 1, 1956. The stockpiling is part of the industry's hedge against a possible steel strike. It could reach 1 million, say industry sources.

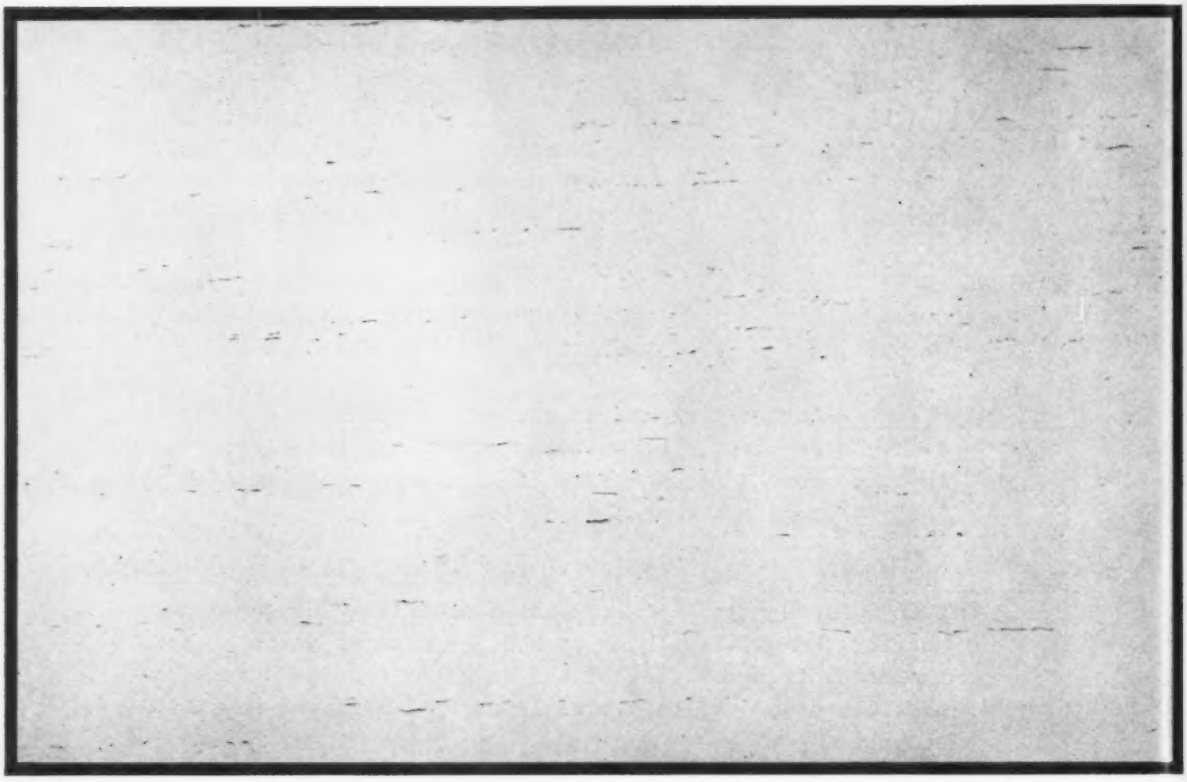
STAINLESS AND ALUMINUM are going at it hammer and tongs in the battle for automotive applications. Less than two weeks ago, aluminum hubcaps appeared to have won out for 1960 models of one of the lower-price three autos (The IRON AGE, May 21, '59, page 99). But last week came word of a switch to stainless for higher strength.

A NEW 'BRAIN TRUST' to counteract Russian economic and political moves throughout the world. That's the latest word from the State Dept. Robert P. Terrill, foreign service officer, will head it up. A House committee is approving funds to finance it.

FABRICATED STEEL BOOKINGS surged to a nine-month high during April, reports the American Institute of Steel Construction. A total of 294,860 tons were contracted by the industry.

DEFENSE SPENDING PATTERN will be little changed in the months ahead. Despite the criticism, Ike's military budget is to go into effect just about as he framed it at the start of this year. Ike proposed a $45.8 billion budget.

Why this steel costs less to machine...



100 X

YOU'RE looking at a photomicrograph of Timken® steel that has been resulphurized to give better machinability. Those sulphides you see in the picture interrupt the chip flow, giving shorter chips and faster machine speeds.

And you get this better machinability without any sacrifice of surface quality or mechanical properties when you buy Timken resulphurized steels. Small amounts of carefully prepared sulphides are added to the molten steel under exact conditions of time and temperature. The result: Substantial improvement in machining speeds and feeds without the harmful side effects (on surface and properties) found in ordinary resulphurized steels. And when you buy Timken fine alloy steel, you're assured of uniformity from bar to bar, heat to heat, and order to order.

If you're looking for a way to reduce machining costs on parts made from seamless tubing, bar stock, or forgings, call your nearest Timken sales office. Timken resulphurized steels are available in most grades of alloy steel. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

WHEN YOU BUY TIMKEN STEEL YOU GET:

1. Quality that's uniform from heat to heat, bar to bar, order to order
2. Service from the experts in specialty steels
3. Over 40 years experience in solving tough steel problems

TIMKEN® *Fine Alloy* STEEL

TIMKEN ALLOY STEEL AND SEAMLESS TUBING IS AVAILABLE FROM STEEL SERVICE CENTERS IN 44 CITIES IN THE UNITED STATES

MISSILE EXPERT: Dr. Wernher von Braun, second from left, the Army's missile expert, talked about steel use and needs in missiles at American Iron and Steel Institute meeting. Others, from left: E. J. Hanley, president, Allegheny Ludlum Steel Corp.; B. F. Fairless, president, AISI, and Max D. Howell, executive vice president, AISI.

Steel Companies Are United Against Union Demands

Steel leaders say they are determined to beat down union demands for higher wages.

But at the same time they worry about the pressures that usually build up during a strike.

▪ Will the steel companies be as united in July — or August — as they are in June?

Steel men say the answer to that one is simple: Yes.

The Big Question—At the 67th General Meeting of American Iron and Steel Institute in New York last week this was the question that bothered everybody. The reason: It is the key to the industry's hassle with steel labor over a new contract to replace the one expiring on June 30.

Without exception, industry leaders buttonholed in the corridors and meeting rooms of the bustling Waldorf-Astoria hotel were firm in their position that the existing contract must be renewed without change for another year. Their argument is that this is the only way to combat inflation and avoid another steel price increase.

1959's Union-Management Crisis

Mills Worry—But there was little doubt that the steel companies are concerned about the eventual outcome. Their position and that of the United Steelworkers are so diametrically opposed that a show of force—a strike—appears to be the only way to resolve the dispute.

That's what has the industry worried. If a strike comes, the pressures mount. Steel users and Government get in on the act. From there on in,

". . . the 'negotiations' so far have been little more than sparring matches as each side tries to smoke out the other."

no one can foretell the outcome. Privately, steel leaders wonder whom, if anybody, President Eisenhower will designate to carry on behind-the-scenes talks with the steel companies — and the steel union after a strike starts. This has been the pattern in past disputes over steel labor contract terms.

Market Strength—Overshadowed by discussion of the labor negotiations but still a major topic with steel leaders was the market outlook. There's more behind market strength than hedging against a steel strike. More steel people were agreeing that business generally is so good that their customers in many cases are far short of the inventory they had hoped to build.

What's more, it was clear that the auto industry, while having a large tonnage of steel in stock, and on the way from the mills, was far from satisfied that it has "enough." This was spelled out privately by steel users other than auto makers who felt the big customers were getting the kid glove treatment while the medium size steel users were getting excuses.

It's Competitive—But a check by The IRON AGE dispelled that idea. Most steel firms are so conditioned to the competitive struggle for long-term customers that all users are prime targets for the red carpet treatment. The only sour note in the whole picture has been the lag in deliveries in Chicago and the Midwest—a lag that is spreading to Pittsburgh and the East.

Another thing: The steel operating rate in late June is a big question mark. Both the union and steel management concede that only a miracle or the direct intervention of President Eisenhower can forestall a strike. And if it looks as though a strike can not be averted, late June steel output will suffer.

The President's Attitude—Washington sources have made it pretty clear that the President will adopt an official "hands off" policy in the early stages of a strike. What he does behind the scenes is another matter. The figuring goes something like this:

—Barring an international blowup, the President would be hard put to declare an emergency at the outset of a strike and thus be able to invoke the "cooling off" provisions of the Taft-Hartley Act. Some industry leaders claim that few users would be hard-pressed for steel before six to eight weeks.

—The President has already gone as far as he wants to—for the moment, at least—to slam the lid on a steel price increase.

—This is not an election year. The pressure for a settlement in the early stages of a strike would depend on how well steel companies still operating for various reasons (The IRON AGE, May 21, '59, page 106) can meet normal defense steel needs.

—The President is disturbed about inflation and he has made up his mind that the stopping point is the steel industry. If he can call a halt to rising prices in steel, it would be perhaps the most dramatic move he could make to drive home his point. What worries steel people is whether the President, faced with the prospect of a long, bitter strike and its consequences to our defense posture and the economy generally, will decide that perhaps a "modest" steel wage rise without a steel price increase is possible. So far he doesn't appear to lean that way.

Conversation about labor covered everything except what David J. McDonald, steel union chief, might or might not do. It was further confirmed (The IRON AGE, May 28, '59, page 70) that the "negotiations" so far have been little more than sparring matches as each side tries to smoke out the other.

There was corridor talk of a five-cent agreement, but this came from people who have had little direct dealings with labor.

Independent sources at the annual meeting were inclined to these conclusions:

—Steel companies are not kidding this year.

—As a result, the impasse is the worst in recent steel labor history: In the opinion of some, bad enough to turn the steel labor relations clock back at least 10 to 13 years.

On other topics:

—A 115-million-ton production year in steel—strike or no.

—A secondary surge in orders that was still going strong last week.

—No shortage of iron ore but a tight squeeze if there is a strike. The movement of ore to mills and stockpiles has been retarded due to holdups on the jammed St. Lawrence Seaway and the uncertainty of some steel people on whether to move stocks from one stockpiling point to the other.

—A 90 pct operating rate in the fourth quarter if the steel strike lasts six to eight weeks.

—A surge of business from the oil and gas industries, the railroads, and so-called miscellaneous users.

—A pickup all along the line in steel mill expansion and replacement of equipment.

—An extreme shortage of trucks, which is throwing more steel shipments to the railroads.

Foreign Competition — Growing competition to steel was spotlighted by Benjamin F. Fairless, AISI president, in his annual address. He stressed that the American steel industry is meeting growing competition both from foreign producers and from other materials. Asserting that high tariff barriers were not the answer, Mr. Fairless declared that American steel mills must continue to improve technology and keep costs under control to meet foreign competition. And the industry must support practical efforts to raise living standards in other countries. Higher standards of living, with higher wages, will be effective weapons against communism and ulti-

Dave McDonald Takes Tough Stand

McDonald Wants More—"Whatever the steel worker is now paid, he's worth more," said David J. McDonald, president of the United Steelworkers of America, during his appearance before the National Press Club in Washington last week.

The steel labor chief thus laid it on the line as he reiterated his position that the steel workers are entitled to more wages, shorter hours, and better working conditions.

Negative Effect—His stand didn't improve chances for a peaceful settlement of the steel labor crisis. Just the opposite. Particularly since the steel companies feel that this is the year to call a halt to higher wage costs and consequent higher prices.

Mr. McDonald accused the steel companies of trying to "hoodwink" the public by stressing the menace of inflation. He says the results of the wage talks need not bring on more inflation. He asserts the steel companies can absorb cost increases several times as large as past wage settlements without raising prices.

Old Sores Recalled—The industry's demand for a simple extension of the current contract would be "taking something away—it would be a retreat" for the steel workers, he said.

The steel labor chief even resurrected the specter of the violence that occurred during the organizing days of the steel union in 1937. He charged that the steel companies wanted to return to those days of violence.

mately help even-up competition, provided further rises in American production costs can be held down.

Rising operating costs are a particularly harsh burden to the nation's smaller steel producers, warned Alwin F. Franz, president, The Colorado Fuel & Iron Corp. He pointed out that smaller companies' profits have been low, and many have not had enough capital to modernize their plants fully. Net earnings for eight of these smaller firms for the period 1954-58 averaged only 4.4 pct of sales, he said. Only by a frontal attack on higher costs and the aid of more realistic depreciation allowances can unemployment, loss of business and a drastic decline in profits be prevented, he declared.

Monopoly of Unions—Control of monopoly unionism is necessary before the country can confidently start its next big circle of growth and progress, said Edward J. Hanley, president, Allegheny Ludlum Steel Corp. Big unions now show the same threat once posed by business monopolies of an earlier day and must be curbed in the same way, he urged. Monoply unions must be brought under the restrictions of the anti-trust laws for the good of the public, he concluded.

"You must get active in politics if you want to stay active in business," declared George M. Humphrey, chairman, National Steel Corp. Speaking at the Institute's banquet last Thursday, Mr. Humphrey urged all businessmen to take personally a far greater part in politics than ever before.

On Russia—The Russian steel industry is in a position to set the competitive pace anywhere in the world, warned Francis M. Rich, vice-president — steel manufacturing, Inland Steel Co. Reporting on the AISI delegation's trip to Russia last year, Mr. Rich presented a six-point program to meet the challenge of Soviet technological and economic advances. This included further exchange of delegations and more steel research for lower-cost and better products.

Replacing natural iron ore with sinter raised daily production of a blast furnace from 653 tons to 1073 tons, J. S. McMahan, superintendent, blast furnaces, The Steel Co. of Canada, Ltd. reported. Speaking at a technical presentation on self-fluxing sinter, he explained that the sinter is composed of caked, iron-bearing materials containing either dolomite fines or a mixture of calcite and dolemite fines.

Institute Awards—The American Iron and Steel Institute Medal was awarded to D. S. Holbrook, president, Algoma Steel Corp., Ltd., Sault Ste. Marie, Ont., for his paper, "The Growing Canadian Steel Industry," presented at last year's general meeting of the Institute. Regional Technical Meeting Award for the best paper in the field of operations was presented to John D. Saussaman, division superintendent, iron and steel, Kaiser Steel Corp., Fontana. His paper, "Effect of Ore Beneficiation on Blast Furnace Operation," was presented at San Francisco last November. Lynn S. Beedle, research professor and chairman, structurals metals division, Fritz Engineering Laboratory, Lehigh University, received the regional technical award for papers in the field of research. His paper, "Plastic Design of Steel Structures," was presented in Philadelphia in November.

At the board of directors' meeting, the present AISI officers were re-elected for another year, and Charles M. White, chairman, Republic Steel Corp., was elected a vice-president of the Institute.

"These vehicles are developed to provide infantry with increased mobility . . ."

Maj. Gen. Robert J. Wood
Deputy Chief of R & D,
U.S. Army

What Mobility Means in Defense

At the Pentagon, they're pretty well convinced mobility will be a major factor in a modern war.

Other metals are being used where steel was once unchallenged.—By F. J. Starin.

▪ A new emphasis on mobility is changing the profile of traditional weapons, vehicles and supporting facilities of the armed forces.

With the stress now on speed, range, ability to overcome obstacles of all kinds, and the need to be airborne, the door to defense programs is being opened to new metals, particularly the light metals. More significant, experience in working with these metals can now be the inside track to many new defense contracts.

As one top executive, deep in defense business put it: "They want everything to fly, and if it can't fly it has to float."

Weight Advantage—Kicking up dirt, above, is the new T-113 personnel carrier, made of about 8000 lb of aluminum. It is slightly smaller than the M59, its steel counterpart. But it weighs only half as much.

Also, because of an improved bulk-to-weight ratio, this vehicle will float, making river crossings routine. The contractor is Food Machinery & Chemical Corp.

Experience Tells—Another example of a company parlaying its civilian experience with aluminum into a profitable defense contract: Twin Coach Co., Aircraft Div. will make 250 aluminum bodies for the Mighty Mite, an aluminum airborne vehicle about half the size of the World War II jeep. It is a test order that is likely to develop into big business.

Says William H. Coleman, Twin Coach president, "Because of our unusual skills in fabricating aluminum . . . we have made substantial contributions to the design and development of the Mighty Mite body. We have reason to believe that the military vehicle industry could be an important source of new business."

Long-Range Possibilities — How big are the possibilities for aluminum fabricators? One Washington source says: "Battlefield mobility concept for the Army is rumored to encompass $5 billion annually for the next three years."

George Bailey, Reynolds Metals Co. Federal sales division manager, estimates the market for aluminum products for military equipment is "several hundred million lb a year with even a greater future potential."

Light Metal Beachheads—Where are the areas for aluminum and magnesium in military equipment? Reynolds surveyed the service branches of the Army, asked where they are using aluminum now, where they will use it soon, and what the future possibilities are. Here's the condensed box score:

The Ordnance Corp. has 15 significant uses of aluminum, and four moderate ones. They range from vehicles through platforms, pyro-

MOVING TARGET: There aren't many obstacles that will stop the new line of light metal equipment being bought by the U. S. Army. Lighter weight-to-bulk ratio in aluminum personnel carrier means it will literally float. And the magnesium mechanical mule is easily moved by most military helicopters.

technics to missiles.

Actual tonnages are classified. But sources report on the T195 self-propelled 105MM howitzer, for example, there is about 12,000 lb of aluminum armor. The tracked vehicle weighs only 37,900 lb compared to 54,100 lb for the M52 steel vehicle. It has a ⅓ lower silhouette, making it a more difficult target. It has a longer range, carries more ammunition, and like its personnel carrier kin it floats.

Mess Kits to Medics — The Chemical Corp. drew up a list of 58 aluminum items, from flamethrowers, masks, bombs and filter units, of which 21 are now on procurement.

The Quartermaster Corps is now working with 13 aluminum items, with one in production, and nine under development. Included: Pallets, food containers, tent poles, canteens, mess kits. Medics use aluminum litters, field chests, and hospital equipment.

Engineering Uses—The Corps of Engineers is using aluminum in 19 different types of equipment now, has 15 others in production, and 36 under development. Some make top examples of the new military thinking. New tractors now under development, for example, will make extensive use of aluminum to make them air transportable. They will be ballasted with dirt when operating.

The Signal Corps says, "The use of aluminum is almost universal in the construction of Signal Corps equipment." Some basic uses: Radio chassis, equipment housings. Some unusual ones: Craig Systems Co., Denvers, Mass., makes an aluminum Helicop-Hut for the Signal Corps. This cubicle containing radar and tracking equipment can be flown into place by helicopter and quickly set up by two men.

NEXT WEEK:

Defense Future

Part 4 of this series on changing concepts in defense business will summarize trends and analyze future developments.

Aluminum Armor Plate—A major factor in bringing aluminum into military markets in a big way was the development of armor plate that can be rolled or extruded cheaply and that can do the same job as steel at half the weight. But once started, several other advantages besides weight savings became evident.

A big one: Aluminum provides good protection from the immediate lethal affects of atomic radiation. Lt. Col. Frederick Timmermann, Asst. chief of Research and Development in the Office of the Surgeon General, told a Senate Committee that soldiers even after exposure to enough radiation to be fatal, if protected by aluminum could continue to man their weapons for several days.

Also, aluminum and magnesium, are non-magnetic, nullifying at least one type of mine and bomb.

Design possibilities are still being probed. The Mechanical Mule, made chiefly of magnesium, weighs 950 lb, but has a cargo capacity of 1000 lb. Several can be picked up by a helicopter at one time.

This versatile vehicle is so designed that if you get a flat, you merely throw away that tire and proceed just as well on three wheels.

What GE Will Rent Out

These are some of the instruments in General Electric's rental pool with their rental charges per month:

Multipoint temperature recorder	**$96**
Voltmeter	**$12**
Gaussmeter	**$12**
Megger	**$24**
Hand Tachometer	**$12**
Thickness Gage	**$16**
Gas Analyzer	**$48**
Flowmeter	**$12**
pH Meter	**$12**
Tensionmeter	**$64**
Frequency Transducer	**$48**
Tape Recorder	**$12**

Equipment for Hire

▪ Why does industry rent, rather than buy, equipment?

General Electric found out after setting up an instrument rental service two months ago. GE offers the rental equipment through its 55 service shops in the U. S. Foreign customers are contacting GE through International General Electric.

Varied Reasons—Here are some of the reasons given for renting:

A metalworker wanted an electronic thickness gage for sheet steel checking while his own unit was being repaired.

Research laboratories are also good customers. They augment their own equipment with rental units for special projects. After the research is completed, the equipment is returned.

Some metalworkers even rent equipment to test its usefulness in their own plants. If an instrument seems worthwhile, they purchase a new one. Others want to spot-check various types of equipment.

Popular Service—General Electric has rented instruments to its own customers and departments for several years. Renting in the open market is relatively new—and its popularity is a surprise even to veterans of the old rental department. Judging from first returns, GE can be expected to soon expand its present rental pool of 13,000 measuring devices.

An almost unforeseen boom in demand pushed rental volume up 40 pct in the first two months of the program. Demand for items as off-trail as a four-channel oscillograph had cleaned out stocks in the pool and more requests are still being received. In case you're looking for one, a four-channel oscillograph can be rented for $48 a month. (For other items see table.)

What's Wanted — Metalworkers are asking for multi-point temperature recorders. Another high demand item: Optical pyrometer ($32 per month) registering heats to 3400°F.

Open-Air Heating

The new home of the San Francisco Giants, Candlestick Park, will be the first heated, open-air stadium in the world.

Because the Giants play so many games at night, and it is quite cool in San Francisco at night even in the summer, a radiant heating system will be installed.

More than 35,000 ft of ¾-in. diam 4-D wrought iron pipe will be spaced on 18- to 48-in. centers and supported immediately below precast concrete seats. Headers for the combination grid and coil-type system will be in the aisles.

McElroy Will Explain Our Air Defense

Continental air defense plans, criticized before Congress in recent weeks, are to be more sharply defined by the Defense Dept.

The Senate Armed Services Committee group demands to be shown that the billions of dollars spent for warning systems, aircraft, and missiles are buying adequate protection for the nation.

Defense Secretary McElroy will submit to the committee an overall air defense outline for the present and for the next few years. It is expected to give in broad terms the quantities of weapons and equipment needed to safeguard the nation against aerial assault.

Mr. McElroy's concept of the relationships between the types of protective items used is to be part of his report to the committee. Best indications now are that he will favor a defense in depth, with warning systems backed by manned aircraft and ground-launched missiles.

How McElroy Sees It—This pattern of defense would have at its fringe the existing distant early warning (DEW) line and the forthcoming ballistic missile early warning (BMEWS) system.

Somewhat closer in, the Air Force Bomarc ground-to-air missile would provide area defense against bomber attack. Point defense would

be the mission of the Army Nike-Hercules, to be launched from batteries near centers of industry and population.

This complex of systems would be under the operational control of the North American Air Defense Command. Centralized direction by that command would, presumably, prevent the leaving of gaps through which attack formations might fly.

The probability that Mr. McElroy will recommend the use of both the Bomarc and the Nike-Hercules may lead to further controversy over these missiles. There has been criticism of his failure to eliminate one of these weapons from defense plans. If, as anticipated, he cites the need for both, new fireworks may break out on Capitol Hill.

Control of Stockpile

A group of Western Senators is pressing for legislation to firmly lock the billion-dollar Defense Materials Stockpile and give only Congress the key.

Sen. James E. Murray (D., Mont.) and 12 other Senators are sponsoring legislation which would require Congressional approval before any material in the stockpiles can be sold.

At present, Congressional approval is needed before goods in the so-called strategic stockpile may be disposed of. But the Office of Civilian and Defense Adm. can sell goods stockpiled under the Defense Production Act whenever it decides that these materials are surplus to defense needs, or obsolete.

The Murray Bill would not prohibit disposal of the DPA stockpile, but would require prior approval of Congress.

Ike's New Adviser

George B. Kistiakowsky will take over in mid-July as President Eisenhower's special assistant for science and technology.

The new scientific advisor, a Russian-born chemistry professor at Harvard University, will succeed Dr. James R. Killian, Jr. Kistiakowsky was an enlisted soldier of the White Russian army during the revolution. He is now 58 years old.

Dr. Killian joined the President's staff in 1957 to advise the White House and help coordinate mushrooming scientific programs as chairman of the Science Advisory Committee. He will continue as a member of the committee after resuming his position as president of Massachusetts Institute of Technology. Mr. Killian resigned the White House post for "compelling personal reasons."

Renegotiation Act

Opponents of the House-passed extension of the Renegotiation Act are making an all-out bid to get the Senate to trim the extension to the 27 months recommended by the Eisenhower Administration.

The House approved the extension for another four years, as recommended by the Ways and Means Committee.

The present Renegotiation Act expires June 30. Efforts in the House by Rep. Richard M. Simpson (R., Pa.) to cut the extension to the 27 months requested by the President were soundly beaten. But there is a chance the Senate might go along with the shorter extension of the act, which gives the government power to recapture what officials consider "excessive profits" on defense contracts and subcontracts.

Openhearths at Pittsburgh Steel

BIGGER AND BETTER: Pittsburgh Steel Co. has boosted capacity of its 12 openhearths from 150 tons to 220 tons, as a final phase of a $111 million expansion and improvement program. Some highlights of the project: $6 million billet mill at Monessen, Pa., works; new hot and cold sheet mills at Allenport, Pa.

Let's LAUGH a minute

Of course everyone knows that heat treating today has become one of the most serious technical and vital functions of the current metalworking activity. But a smile and laughter are still also important and the cartoons shown here are for that purpose.

We hope they make you grin and when it's heat treating services you require or skilled, technical advice about part design or heat treatability, check with

METAL TREATING INSTITUTE
271 NORTH AVENUE
NEW ROCHELLE, NEW YORK

or any member listed below.

Sound Familiar?
SHEARCASE, THE PRODUCTION MAN, SCHEDULES A JOB THROUGH HIS PLANT WITH TIME TO WASTE!
LET'S SEE... PLENTY OF TIME FOR A GOOD JOB ON OPERATION 1... NUMBER 2 SHOULD BE ABLE TO OKIE ALONG NICELY... AMPLE TIME FOR OPERATION NUMBER 3... THEN OUT IT GOES FOR HEAT TREATMENT
PRODUCTION SCHEDULE
OPER. #1
OPER. #2
OPER. #3
BUT... WHEN THE HEAT TREATER GETS IT... IT'S IN AN AWFULLY GREAT HASTE!
SHEARCASE! HOW'S THAT JOB COMING? TIME'S RUNNING OUT!
FINE, BOSS! I GOT IT TO THE HEAT TREATER 10 MINUTES AGO, I'M CHECKING WITH THEM NOW.
HELLO! ABC HEAT TREATING? WHAT? NOT THROUGH WITH OUR JOB? DO YOU REALIZE WE HAVE A TIGHT SCHEDULE? TRYING TO MAKE ME LOOK BAD, HUH?.. BLAH, BLAH, BLAH...

Sound Familiar?
CARELESS MILFORD IS NOT PARTICULAR ABOUT THE PARTS HE SENDS IN FOR HEAT TREATING
BUT!... TAKE A LOOK AT THIS CASTING!
...OFF-SIZE, WICKED, CRACKED AND WHAT HAVE YOU. HOW DID IT EVER GET OUT OF THEIR PLANT,... OR DON'T THEY CARE?
Jeffords Heat Treating Co.
BUT... WHEN HE GETS THEM BACK... WHAM! LOOK WHO GETS THE BLAME!!!
CALL YOURSELVES METAL TREATERS? HAH! YOU SURE GAVE OUR CASTINGS THE 'TREATMENT'! - THEY GO OUT OF HERE 100% PERFECT,... AND WHAT HAPPENS? DO YOU PROP 'EM OFF THE ROOF OR JUST RUN A TANK OVER THEM?. IF YOU HAVE NO CONSIDERATION FOR A CUSTOMER'S PRODUCT I'LL JUST HAVE TO...

MTI MASTER CRAFTSMEN METAL TREATING INSTITUTE

American Metal Treatment Co.
Elizabeth, New Jersey

Anderson Steel Treating Co.
Detroit, Michigan

Benedict-Miller, Inc.
Lyndhurst, New Jersey

Bennett Heat Treating Co. of Texas
Newark 3, New Jersey

Cook Heat Treating Co. of Texas
Houston 11, Texas

The Dayton Forging & Heat Treating Co.
Dayton 3, Ohio

Deming Heat Treating Corp.
Dallas, Texas

Fred Heinzelman & Sons
New York 12, New York

Alfred Heller Heat Treating Co.
New York 38, New York

Hollywood Heat Treating Co.
Los Angeles 38, California

Ipsenlab of Rockford, Inc.
Rockford, Illinois

L-R Heat Treating Co.
Newark, New Jersey

Metallurgical, Inc.
Minneapolis 14, Minnesota

Metallurgical, Inc.
Kansas City 8, Missouri

Owego Heat Treat, Inc.
Apalachin, New York

Paulo Products Company
St. Louis 10, Missouri

Pittsburgh Commercial Heat Treating Co.
Pittsburgh 1, Pennsylvania

The Queen City Steel Treating Co.
Cincinnati 25, Ohio

J. W. Rex Company
Lansdale, Pennsylvania

Stanley P. Rockwell Company
Hartford 12, Connecticut

Scott & Son, Inc.
Rock Island, Illinois

Syracuse Heat Treating Corp.
Syracuse, New York

Temperature Processing Co.
North Arlington, New Jersey

CANADA

Ipsenlab of Canada Ltd.
Toronto, Ontario

Robert A. Beall

Leading the Way in Rare Metals

Bureau of Mines research is uncovering many of the mysteries of rare metals.

Much credit for recent breakthroughs goes to Mr. Beall and his research team.

The path to Robert A. Beall's door at the Bureau of Mines melting laboratory, Albany, Ore., is becoming well-worn by the footsteps of visitors from many parts of the world.

Mr. Beall, project coordinator at the melting laboratory, has in 10 years developed into a top authority on the consumable electrode arc melting technique. He is responsible for many metallurgical breakthroughs accomplished by the research team at Albany. His lab has become a focal point of rare metals research.

On Record—Some of the breakthroughs:

The first successful method for casting large zirconium and titanium shapes; a method for melting thorium to produce sound, uncontaminated ingots; a patent for melting refractory metals for casting purposes.

Under his direction, a research team melted all the zirconium for the original reactor used in the atomic submarine Nautilus. Their work greatly speeded up completion of that vessel.

Industry Benefits—There's a lot more to Mr. Beall's story. The Bureau of Mines reports that his skill and ingenuity have made possible the creation of new industries at home and abroad.

For example, he helped design a commercial melting plant to produce thorium, and was a consultant in development of a titanium melting and casting plant in Sweden. A number of other companies use his techniques in applying metallurgical methods to large-scale production.

ROBERT A. BEALL: Ability and enthusiasm in government research.

His Background—A native of the Seattle area, Mr. Beall was graduated from the University of Washington in 1941 with a degree in physics. He served in the Navy during World War II. After the war, he worked for a Seattle instrument company before joining the Bureau of Mines in Albany in 1949.

Starting out as a laboratory mechanic, he worked his way to the top post in the melting lab through what his superiors describe as "outstanding enthusiasm and ability."

Awards Follow — This ability helped the Bureau of Mines win the 1957 Chemical Engineering Achievement Award for developing the metallurgy of zirconium, titanium, and uranium.

Recently, Mr. Beall, who is 38, received two honors from the U. S. Government. He was given the Arthur S. Flemming Award, a tribute to outstanding young men in the government, and the Dept. of Interior's Meritorious Honor Award.

His work points up the valuable research being done by dedicated government scientists.

WELDING CLINIC

J. Imperati and R. F. Pulver, Welding Engineers
The American Brass Company, Waterbury, Conn.

Steel products are assembled economically with Anaconda filler metals — by brazing or braze welding

Many of the steel products encountered in our everyday lives are assembled by economical braze welding and brazing with dependable and versatile Anaconda filler metals. Among these products are home, school and office furniture, frames for wheeled toys, bicycles and portable power generators, screen and storm-sash frames, sink and refrigerator cabinets, etc.

BRAZE WELDING. The filler metals used are Anaconda-997 (Low Fuming) Bronze, Tobin Bronze® -481, and Nickel Silver-828. Their low application temperatures produce distinct advantages for oxyacetylene braze welding, such as excellent control, simple joint and fixture designs needed for efficient production, and low distortion. In addition, when molten, they easily bridge gaps in poorly fitted joints and readily build up fillets and reinforcements to develop maximum joint strengths.

TWO HALVES of stainless-steel knife handles are joined by controlled-atmosphere brazing using Anaconda Nickel Silver-828 Welding Wire at The Imperial Knife Company.

BRAZING. Most of these advantages are also available when the alloys are used for brazing in induction-heating and controlled-atmosphere furnace operations. An excellent example is the manufacture of stainless-steel handles for table knives. Imperial Knife Co. of Providence, R. I., uses Nickel Silver-828 for controlled-atmosphere brazing in production of the knife handles shown at the right, above. High-quality joints are essential for durability and good appearance, and high quality is just what this alloy confers. It develops high strength by making full-section joints, and the polished joints are inconspicuous because the alloy's color is so close to that of the steel.

The 1/16" diameter wire is cut into short lengths which are placed within the hollow handles when their two halves are assembled before entering the furnace. When the brazing temperature is reached, the molten filler metal flows by capillary action between the butted edges to bond the joint completely.

FOR MORE INFORMATION. Anaconda distributors will gladly help in the selection of the exact rod for your job. Or write for a copy of Publication B-13. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 8978

SIDE OF A HOSPITAL BED being assembled at Simmons Co., Kenosha, Wisc., by braze welding with Anaconda-997 (Low Fuming) Bronze Welding Rod.

ANACONDA®
WELDING RODS
Made by
The American Brass Company

Business Advances on Firm Front

It's hard to find a weak spot in business today. Most industries are sharing in the boom.

Favorable reports on third and fourth quarters by steel leaders dispel lingering doubts.

▪ The big thing to remember about the business advance: It's surging ahead on a broad front, with few weak spots and a lot of depth.

As you run down the business statistics and indicators, the trend is universal. Unlike even the big boom of 1956, there is little of the "spotty" nature to be found among the good business reports.

Most businesses are producing at profitable rates. Workers are taking home fat pay checks—and are using them to buy both durable and nondurable goods. As demands for consumer goods stay strong, more businesses are seeing the need to spend for new and more efficient equipment.

Big Nudge from Steel — Steel executives aren't just talking for effect when they say they now expect very good third and fourth quarters—if by some miracle the impending steel strike can be avoided.

If there is a single bit of news that stands out, it is in these reports from steelmakers—that the operating rate will not collapse in the second half.

That fear has been the principal cause of any lingering doubt. Inventory cutbacks in the steel industry have a long, sad history of compounding a one-industry setback into a full scale recession.

Good Psychology — It's an odd fact that an inventory-eating steel strike would not have the serious impact on business sentiment that a mild period of steel inventory control would have. Business, as much as the individual, can be the victim of psychology. The good word on a continuing strong steel demand will have a bolstering effect on all business.

The rate of business advance is indicated in the first quarter Gross National Product. At an annual rate of $467 billion, the first quarter gain was $14 billion over the previous quarter and $40 billion above the 1958 quarterly low.

Only Export Is Off—Breaking down the quarterly GNP gain, consumer buying and inventory accumulation each added about $5 billion to the rise. Housing construction added another $1.5 billion as did state and local purchases.

Of the elements that made up the total GNP, only exports contributed bad news. At an annual rate, the quarterly drop was $300 million. Unless there is a reversal in foreign demand, the export market is not encouraging. Fear is that the recent declines may not be temporary, but the start of a long decline.

Federal spending has held steady, with only moderate gains. However, state and local spending is on the upgrade and may show some major increases, providing the pinched local and state governments can come up with the financing. Most are committed to fatter budgets, but are having a hard time raising the cash.

News Is Good at Retail, Too

▪ At times like these, it's wise to keep close check on retail sales for and tipoffs in personal buying trends.

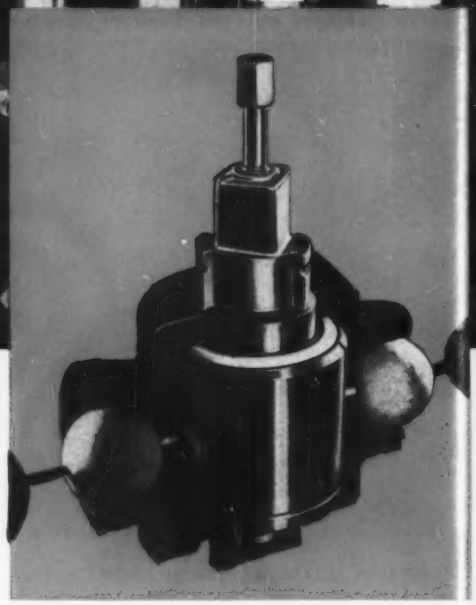
Right now, personal income is headed steadily up. And it's followed closely by a parallel upward movement of individual spending. In the last half of 1958, personal income advanced at a rate of about $1 billion a month. But this year the rate of gain has been even faster.

Climb Continues — Figures for April, according to the Dept. of Commerce, put the total at an annaul rate, seasonally adjusted, of $372.5 billion. This is up more than $3 billion from March and $7.5 billion from February. There is every indication that the same rate will extend through June.

As a result of these improvements, retail sales are also gaining, and should continue to do so. The rate for the first four months of this year is about 8 pct over a year ago.

Volume Sales — Most significant is that the gain has been in physical volume of goods bought, not in prices. Durable goods stores all report increased business, as do the vastly cheered auto dealers.

Building material and hardware are also on the upgrade. Furniture and appliances, important for metalworking, continue steady advances. Nondurable goods, significant as a reflection of attitude, are up about 5 pct from a year ago. However, there had been only a negligible dropoff in nondurables, so a small gain is equally important.



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For example: You can see excess lubricant as it escapes around the neck of the plug—no build-up of excessive lubricant pressure; no lubricant forced into the line.

For example: Special design requires a minimum amount of lubricant for servicing.

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W-K-M provides a complete line of specially formulated lubricants for ACF Lubricated Plug Valves. Write for Catalog 800

W-K-M
SERVING INDUSTRY 40 YEARS

AN IRON AGE SPECIAL REPORT TO MANAGEMENT

How to Prepare for Greater Business Responsibility

By S. M. Boyden—President, Boyden Associates, Inc., New York

There are tremendous opportunities in business for men who are ready for added responsibility.

Many men make these important mistakes: Not preparing themselves or not evaluating their company or industry in terms of their future.

▪ Are you preparing yourself for business leadership? If you are ambitious to reach a high rank in industry, you couldn't be pursuing a career at a better time in history.

Never before has there been so much room at the top in American industrial management. Never before have there been so many opportunities for qualified men to rise to top positions in business.

Professionals Needed—The door is wide open because the complexities of modern business, with its keener competition and greater demands on top people, have forced companies to scrap the old way of picking leaders. Few presidencies are handed down from father to son; fewer big stockholders are taking over the main chair in the boardroom; and fewer veteran vice presidents are succeeding to presidencies merely on seniority.

We are now in the era of the professional manager. Responsibility of command in business is now being entrusted to men who have developed high-standard skills and judgement by mastering successively greater challenges.

Do You Qualify?—Men like these are in demand because, in the modern competitive situation, success or failure is not determined by superior machines, materials or production processes. These are available to all companies. Today it is the quality of the leaders and decision-makers which is the paramount factor in competitive success.

With so much room among management positions, it is ironical that relatively so few men are qualified or available for the jobs.

If your career is about 15 years

His Job Is Recognizing Executive Ability

▪ When a company finds it necessary to go outside of its own staff to fill an executive post, it's a good possibility it will consult Boyden Associates, Inc., headed by S. M. Boyden, left.

The company is one of the country's leading executive search firms. Its staff maintains close contact with careers of thousands of executives who are qualified to assume broader executive responsibilities.

On these pages, Mr. Boyden lists the qualities of executive leadership and offers a program of self-analysis that can help lead to promotion.

Here Are Seven Points That Affect

1. Appearance—Some of the differences between the man who can be promoted and the man who is unpromotable are as obvious as the expression on his face, his handshake, posture, and general cleanliness and neatness.

2. Leadership—Several qualities comprise leadership. One is ability to inspire people under you. The leader produces a willingness in them to do their best.

He is a man of courage and integrity, willing to share in the blame in a subordinate's mistake, generous in sharing praise. He is not afraid of able assistants. He is a good organizer who can delegate responsibility and authority.

3. Initiative and Drive—What it amounts to is giving the job every bit of effort and being willing to take on new responsibilities. Don't worry about not having specific experience. And don't be afraid to improvise when a strange problem baffles old methods.

4. Point of View—One of the prime essentials is a willingness to think as a company man rather than as an individual. The man who wants to succeed should use his firm's interest as the frame of reference for the thinking that goes before a decision.

In a choice between two well-qualified men for a high-level job, the decision often favors the man who has made reasonable sacrifices in the interests of his company.

5. Knowledge—In the higher levels of management, a man is expected to show not only a broad knowledge of his industry and its allied fields, but of the world in general. The need of a good working fund of general knowledge is of inestimable value to the modern manager.

In these days of rapid technological change, of more government influence in business, of greater appreciation of public relations factors in corporate decisions, an executive must have at least a broad familiarity with the sciences, with politics and the humanities.

6. Speaking Ability—The days when the master of a business ruled in anonymity, inaccessible to the public, are gone forever. It is no longer enough for an executive to be knowledgeable and to have ideas—he must communicate them to his associates, superiors, industry meetings, and to the increasing number of public gatherings.

---

along, and you figure that your experience and abilities will some day reward you with a top management position, you may disagree with that conclusion. And you would be right, provided you can answer these questions with the word "yes."

Soul Searching—Do you know what the personal traits of a business leader are, and, if you lack some of them, are you developing them in yourself?

Are you in the right company; in the right industry?

Do your job experiences dovetail into a pattern which is preparing you for a management position?

Do you know what and when your next move upward will be?

Do you know where your industry, your company, and you, yourself, will be in five years? In ten?

If your answer to all of these questions is "yes," your career is probably going full speed ahead on an uphill track. But if your answer to some, or all, of the questions is negative, then your career may be in trouble.

Major Errors—As consultants to management on executive selection, Boyden Associates, Inc., is regularly retained by the presidents and directors of many leading companies to provide them with confidential counsel and negotiating guidance when they are confronted with the problem of bringing major executives into their companies at the officer level.

In this experience of serving companies and interviewing thousands of executive candidates, we have concluded that there are two major errors ambitious men of high potential make as they build their careers: Poor preparation and bad guessing.

The first mistake is evident in the man who must be turned down because he cannot offer a fund of knowledge and expereince developed according to an organized plan that will qualify him for high leadership responsibilities.

Company Factor — The second error is committed by the man of great potential who has allowed his progress up the executive ladder to be governed by questionable factors that never paid off—by company growth, seniority and the right of succession.

Some companies fail to grow. The man who counts on succession may find himself frozen by a superior who is frozen in his own tracks. And the man who counts on seniority alone may one day find himself

Promotability

Part of the executive's equipment must be the ability to speak and write well, to communicate ideas simply, logically, and convincingly. If a facility for effective communication is not one of your strong points, you can take a course in public speaking and avail yourself for every opportunity to talk before groups. Start small—church committee or community club, but the more often, the better you'll talk.

7. Social Acceptability—This means being able to mix socially with all kinds of people. High management depends upon it to a considerable extent. The candidate with everything else in his favor may be passed over if he is guilty of annoying mannerisms, bad manners, or if he is narrow-minded about people whose backgrounds are different from his.

reporting to a better qualified man brought in from the outside.

If a man is guilty of these mistakes, he shouldn't despair; it is rarely too late to change. For the man whose career appears to be blocked, the first move should be a careful stock-taking. Then he should plan, step by step, the adjustments he must make to correct his deficiencies—and he should make these adjustments without delay.

Qualities Needed—My associates and I are often asked: "What are the marks of a good executive? What is it that your clients look for in an executive candidate?" A good general answer to the first can be found in the answer to the second. Our clients usually say, "Give us a man good enough to eventually succeed our president."

Over the years we have worked with a wide range of the country's leading corporations in solving their executive personnel problems. Although the specifications have varied in detail from job to job, there has been a basic agreement among these companies on the qualities and factors essential to qualify a candidate for an executive position.

Seven Points—These factors fall into two general categories, the first of which might be called the Seven Points of Promotability. These are spelled out in detail, above. Some of these points may seem obvious to you. They are obvious, but they are listed because their importance is so often ignored or underestimated.

Improve Yourself—None of these traits and characteristics need be lacking in your makeup provided you have the capacity to observe and are willing to learn from others.

The second group of success factors involves a man's business experience. Once you have analyzed yourself on the qualities of promotability, you should review your present and past business connections according to these criteria:

1. Experience — The man who wants to get ahead should make a frank appraisal of the industry and the products with which he has been associated over the years. Is the industry moribund, or is it in the mainstream of the economy? If the problems and day-to-day challenges of both the industry and the product have little or no resemblance to the problems and challenges of most modern industries and products, they have been a poor training ground for executive qualification by the standards of today's business world. A brilliant career in the bugg-whip industry will not impress the board of a corporation competing in today's markets.

2. Company Quality — There should also be a frank appraisal of the companies with which a man has been associated. A firm with a reputation for integrity, for sound progress and growth, for aggressive competition and solid profits—and for high personnel standards—produces a much more preferable candidate for high management position than does a mediocre concern. This realistic scrutiny should not exclude your present company. Ask yourself where your firm will be five years from now.

3. Advancement Record — The responsibilities a man has had in the past influence the determination of the responsibilities he will be given in the future. Take a look at your record of advancement and see if it shows progress in your ability to hold down increasingly tougher assignments—and, by the same token, shows an increase in your employers' trust in your capabilities.

Look Ahead—Take a look forward and estimate where you will be five years from now. Are your present responsibilities moving you into a dead-end, off the main thoroughfare of the company's activities? Or are they a vital contribution to the business, and, therefore, bound to grow in importance with the years?

And while you are adding up your own prospects, total those of your immediate superior. If you are next in line behind an executive who is the same age as you are, or who is not going to move any higher, you probably are stymied.

Another measure of your progress and your prospects can be found in a check on the careers of those of your contemporaries whose ambitions are the same as yours.

A careful and honest review of all these success factors will provide some measure of guidance for the man who wants to go higher and further in the realm of corporate leadership. If you are aiming for the top and you feel that you are not being afforded an opportunity to move ahead in your present company, consider carefully the possibility of becoming associated with a going and growing concern.

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New Push for Stainless Products

Allegheny Ludlum Promotes Mufflers, Clad Bumpers

Big volume potential of automotive market is attractive to stainless producers.

Allegheny Ludlum takes the initiative in latest sales campaign.—By H. R. Neal.

▪ Allegheny Ludlum Steel Corp. is brandishing a number of gleaming experimental products aimed at capturing a larger share of the automotive stainless steel market.

One of these attention getters is the much-talked-of but little-seen stainless steel muffler. The company reports that a number of these corrosion resistant mufflers are now being tested on a variety of automobiles throughout the country.

ENDURABLE: An experimental stainless steel clad bumper developed by Allegheny Ludlum is examined by a company secretary. This bumper has been undergoing comprehensive field tests for more than two years.

Automakers Nibble—No hint as to the initial cost penalty involved has been given, but some indication of the potential savings was given. High compression engines and high octane fuels eat their way through 25 million mufflers a year for a replacement bill of $290 million.

Stainless steel mufflers are currently being used on some trucks, but automakers are still cold to the idea because of cost. Automakers politely nibble at the bait, but haven't shown enough interest to bite. They know mufflers are a problem. Some switched to aluminized steel this year for mufflers in hopes of extending the life to 2 or 3 years instead of the 12 to 18 months for carbon steel mufflers.

First Owner Considered—But the automakers aren't convinced a lifetime muffler, with its added cost, is worth the money. They're satisfied as long as a muffler lasts through the time the first owner has the car.

Generally, that's all the initial owner cares about either. Undoubtedly there are merits in stainless steel mufflers—even as an extra cost option. And many stainless producers are willing to settle for that as a foot in the door.

Bumper Situation—Bumpers of stainless steel are also being pushed. The long-life appearance advantages are obvious—from both the functional and appearance standpoints. But cost, once again, is an obstacle.

Solid stainless bumpers for a popular medium-priced car were made experimentally on the same dies as used for production runs of carbon steel bumpers. Initial material cost was 300 pct higher, but finished cost was only 60 pct higher than for the carbon steel bumper after plating and finishing.

Clad Offers Hope—A-L has just completed field tests on a bumper of stainless steel clad on both sides of a mild steel core. After more than two years service there was no evidence of pitting, peeling or corroding. It is expected that use of stainless clad steel would reduce significantly the cost penalty.

However, auto engineers are still skeptical over possible use of stainless clad steel for bumpers because of present styling trends. Many bumper shapes require severe draws. Apparently, there is a tendency for the clad materials to separate under the stresses. A return to simpler bumper designs would overcome this. And there are some indica-

tions this line of thinking is developing.

Interest Grows—One automaker is taking a serious look at the possibility of using stainless for bumpers on its forthcoming small car. If not this year, then possibly next. It has also been reported that at least part of Mack Truck Co.'s 1960 line will sport stainless bumpers. In both cases, however, the bumpers are of a relatively simple design—without "Dagmars," fluting, or the Dead Sea Scrolls embossed on them.

At least five foreign autos coming into this country have stainless steel bumpers, according to a source connected with the American Iron & Steel Institute. Three of these, Facel-Vega, Moretti, and Lancia, are high priced and seldom seen. But two, Citroen and Peugeot, are priced with the "low-priced three" and are found in modest numbers.

New Finishes Coming—With an eye to expanding its sales, A-L also promotes its customers. Last January, for example, it revealed a new frosted finish for stainless called "Fro-Zon." The finish developed by Stamping Service, Inc., Detroit, uses a type of "semi-blasting" technique which gives the metal a frosted look by forming tiny mounds on the surface of the metal. The developer is also working on coloring with the new process.

It would seem that A-L is working to generate some interest among the buying public for stainless as a means of hastening acceptance by the automakers of some of the proposed uses. It's much the same approach used—and successfully, too—by the aluminum industry. Not all of the ideas click, but enough do to make it worth the effort.

Chrysler Reshuffles Organization

Chrysler Corp. added a new step to its management shuffle last week when it announced a major realignment of its sales and divisional organizations. The changes were immediately interpreted as a move to strengthen its sales organization and bolster sales.

Automotive Production

WEEK ENDING	CARS	TRUCKS
May 30, 1959*	117,470	24,829
May 23, 1959	133,568	27,301
May 31, 1958	66,574	15,038
May 24, 1958	86,082	18,043
TO DATE 1959	2,726,249	535,174
TO DATE 1958	1,904,470	375,425

*Preliminary Source: Ward's Reports

The most important change was the merging of Plymouth and De Soto divisions under Harry E. Chesebrough, Plymouth division general manager. Presumably, the new division will also be responsible for Chrysler's new, smaller car, the Valiant.

Quinn Heads Sales—At the same time, establishment of a new sales divisions group was announced by Byron J. Nichols, vice president of automotive sales, and a new combined sales staff.

The sales divisions group will be headed by E. C. Quinn, vice president and general manager of Chrysler Motor Corp., the company's sales organization. The combined sales staff will be under J. B. Wagstaff, formerly general manager of De Soto.

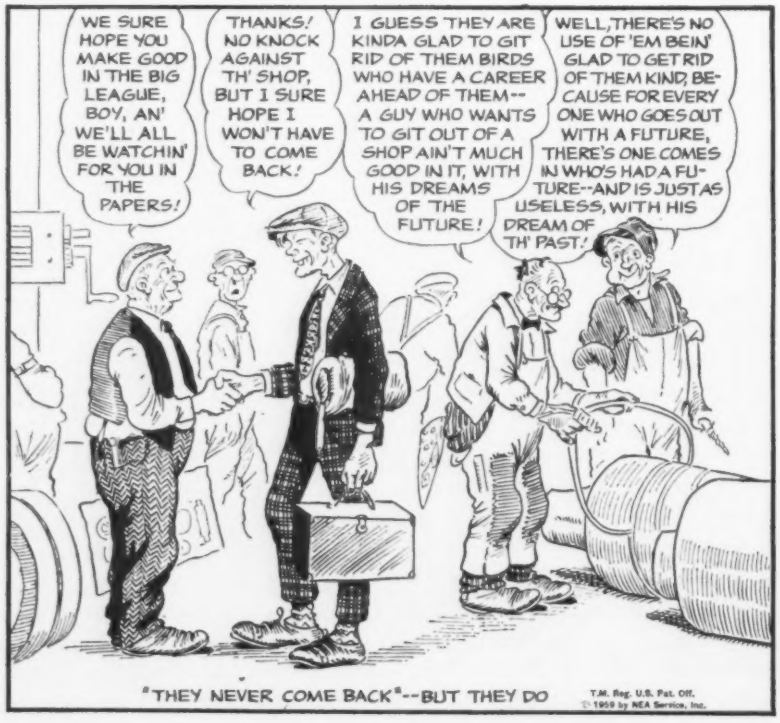
GM Swings Back

Customer and dealer dissatisfaction over similarity in size and appearance of General Motors automobiles, reportedly will cause GM to return to the three body shells employed until this year.

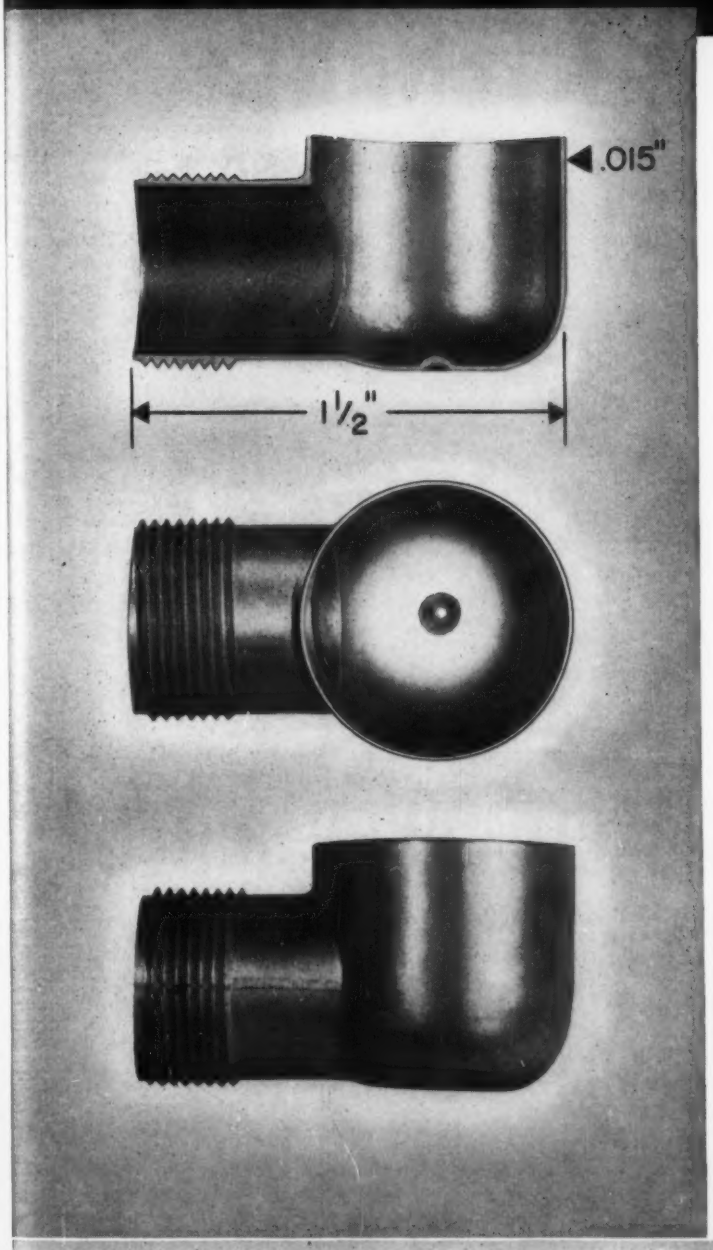
The present modified single body concept permits different wheelbases and overall lengths for GM's five lines, but holds them to a common width. The differences result from varying front and rear overhangs, rear underbody sections and rear quarter panels and decks.

The body line-ups will be the same as before: Chevrolet and small Pontiac, A body; large Pontiac, small Oldsmobile and small Buick, B body; and large Buick and Oldsmobile and all Cadillacs, C body.

The Bull of the Woods


WE SURE HOPE YOU MAKE GOOD IN THE BIG LEAGUE, BOY, AN' WE'LL ALL BE WATCHIN' FOR YOU IN THE PAPERS!
THANKS! NO KNOCK AGAINST TH' SHOP, BUT I SURE HOPE I WON'T HAVE TO COME BACK!
I GUESS THEY ARE KINDA GLAD TO GIT RID OF THEM BIRDS WHO HAVE A CAREER AHEAD OF THEM-- A GUY WHO WANTS TO GIT OUT OF A SHOP AIN'T MUCH GOOD IN IT, WITH HIS DREAMS OF THE FUTURE!
WELL, THERE'S NO USE OF 'EM BEIN' GLAD TO GET RID OF THEM KIND, BECAUSE FOR EVERY ONE WHO GOES OUT WITH A FUTURE, THERE'S ONE COMES IN WHO'S HAD A FUTURE--AND IS JUST AS USELESS, WITH HIS DREAM OF TH' PAST!
"THEY NEVER COME BACK"--BUT THEY DO
T.M. Reg. U.S. Pat. Off.
© 1959 by NEA Service, Inc.

IT'S LIGHTER THAN YOU THINK!



AND STRONGER, TOO, WHEN DIE CAST with ZAMAK

This thin-wall spark plug shield is a zinc die casting with minimum wall thickness of only .015".

Many zinc die castings are as thin as stampings, yet can be produced in shapes that cannot be duplicated as one-piece stampings.

More and more, engineers are learning that they can design parts for ZAMAK alloy die casting that will compete with either steel stampings or castings of the lightweight metals—and at lower cost.

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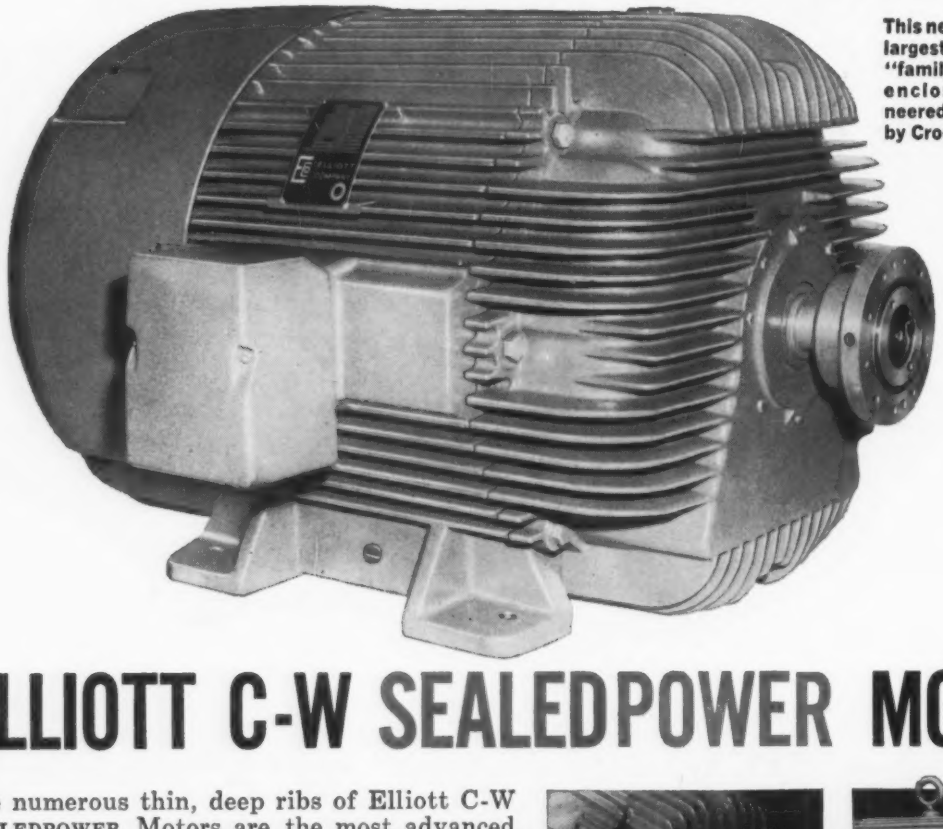

This new 300-hp unit is the largest of the Elliott C-W "family" of ribbed-frame enclosed motors, pioneered in the United States by Crocker-Wheeler.

ELLIOTT C-W SEALEDPOWER MOTORS

The numerous thin, deep ribs of Elliott C-W SEALEDPOWER Motors are the most advanced development of the ribbed construction, pioneered in the United States by Crocker-Wheeler. Modifications of SEALEDPOWER totally-enclosed fan-cooled motors include explosion-proof designs in all ratings up to 300 hp. Either open greasable or pre-lubricated bearings can be furnished.

Highly-effective sealing prevents entrance of moisture, dust, dirt, corrosive materials; consequently these motors can be depended upon for long, trouble-free service.

In numerous cases, SEALEDPOWER motors are proving to be more economical than standard open motors because of their low maintenance and dependability.

Extra fins keep bearing cool. This potential trouble spot is effectively cooled by the generous extra fins seen in the photograph above.

Cooling blast hugs frame. Air is directed along fins extending entire motor length. Easy to clean — no enclosed cooling passages to clog up.

Newest data on modern enclosed motors—including explosion-proof—is given in Elliott Bulletin PB 6000-2. Send for free copy today.

ELLIOTT Company

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W9-2

Ike Wins on Defense Spending

Congress Will Likely Vote Just What He Wants

There'll be some trimming and adding, fussing and fuming.

But when the votes are cast the big spenders in Congress will lose.—By G. H. Baker.

▪ There'll be little change in the pattern of defense spending in the months ahead.

Ike's military budget, despite all the criticism of it, is to go into effect soon just about as he framed it at the start of this year.

This means total spending for procurement will tend to remain close to the rate already established for the current fiscal year. True, there'll be some new projects, some trimming of the old ones. But except for this minor pruning to keep the overall defense mechanism up to date, there will be no major upsets nor any startling additions to the total defense budget.

Defense Dollars — In mid-January, Ike proposed to the Congress a $40.8 billion ($39.2 billion now; about $1.6 billion later) military budget for the 12-month period beginning July 1. Based on what the House Appropriations Committee is recommending, a final total close to this will be handed the Pentagon soon.

There is, however, one major omission in the defense money bill okayed by the House panel: No new super carrier. Last November, the Navy sent to the White House its tentative budget, including $400 million for a nuclear-powered carrier. Ike told Navy this could wait. He suggested a $260 million steam-powered carrier. Now the chances of getting even this are dim.

Senate Offensive—There will undoubtedly be a strong drive in the Senate to add substantially to the defense money bill. But in the showdowns this year, big spenders have not been having their way.

Tariff Talks in 1960

A new round of talks aimed at tariffs cuts among free world countries will open in the fall of 1960.

The General Agreement on Tariffs and Trade (GATT), to which 38 countries including the U. S. are parties, will open its next round of conferences in September 1960, at a site still to be picked.

Order of Business—First changes to be made in existing tariff concessions between members are likely to be mostly withdrawals of past tariff cuts. The members will then attempt to work out new tariff-cutting agreements at a meeting scheduled to open in January 1961.

McElroy Will Stay

Neil H. McElroy, taking aboard a veteran Pentagon executive as his deputy, now expects to continue indefinitely as Defense Secretary.

Mr. McElroy is rounding up experienced men to assist and advise him. He has Thomas S. Gates, Jr., outgoing Navy Secretary, as Deputy Secretary of Defense. And he has asked Adm. Radford, former head of the Joint Chiefs of Staff, to come out of retirement to be his consultant.

Labor Gets a Stand-Off

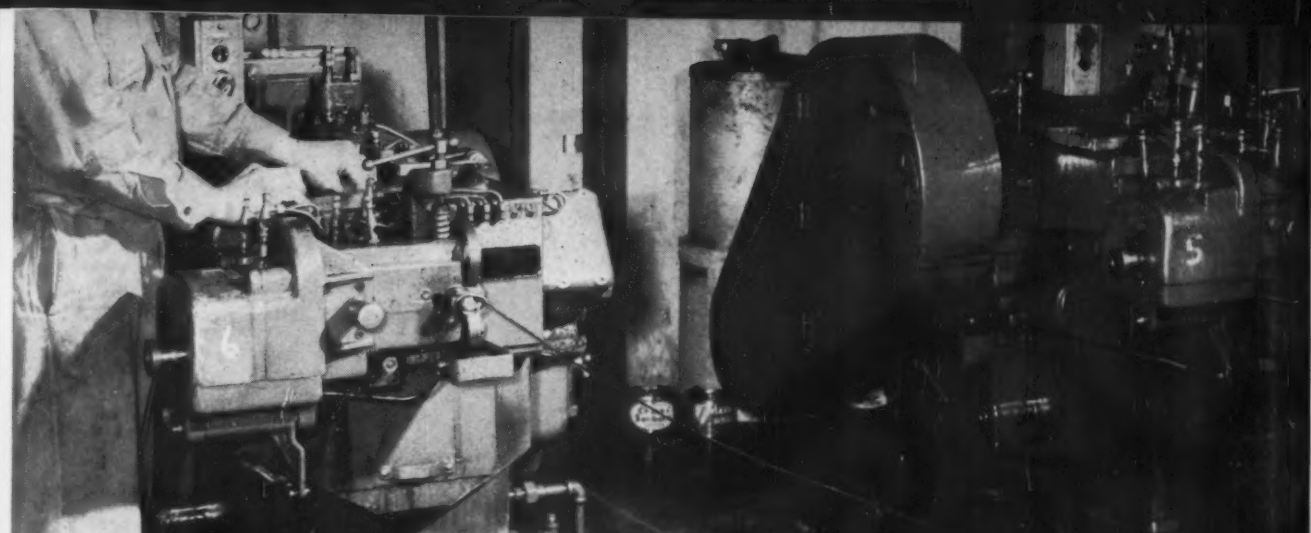
Leave Labor Alone—More and more, labor reform looks like a lost cause in 1959. The AFL-CIO hierarchy has huffily withdrawn its earlier lukewarm endorsement of the Kennedy soft-reform bill.

On the other hand, a quietly effective coalition of Southern Democrats and Republicans is working behind the scenes in the House to add some meaningful reforms, such as a ban on blackmail picketing, to the Kennedy bill.

These are widely divergent views. As a result, it's becoming increasingly evident that Congress probably will get hung up and fail to vote any kind of labor reform this year.

Sugar Coated — Democratic leaders will be very embarrassed if they fail to soften the Taft-Hartley labor law a bit. In the first flush of victory in last November's elections, some leading Democrats promised labor leaders they'd write some soft-pedal changes into the Taft-Hartley law. (Examples: Making foremen subject to unions). Senator Kennedy (D., Mass.), added these changes to his soft-reform bill as sweeteners to make reform more palatable to union chiefs.

Now, with his soft-reform bill in trouble, there's a very real possibility that the Democratic leadership in the Congress will have to back down completely on its promises of Taft-Hartley changes.



The high degree of plasticity of J&L special heading screw wire and its freedom from surface defects have virtually eliminated splitting problems for Midland Screw Corp.

At Midland Screw Corporation

J&L special heading screw wire solves tough recessed-head screw production problem

Midland Screw Corp. of Chicago, at its Millersport, Ohio, plant has found J&L special heading screw wire "... a consistently high quality product that we can depend upon."

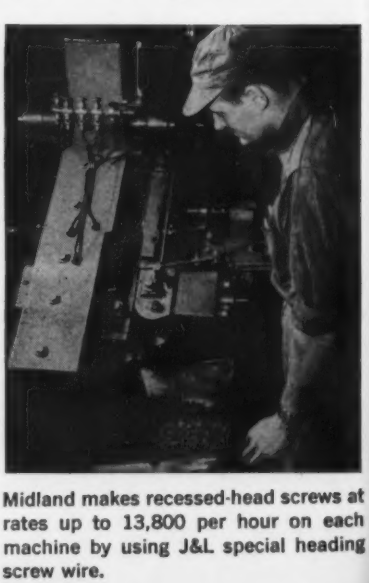
Midland makes 4,500 kinds of screws, all to very close tolerances. The recessed-head types include round heads, oval heads, pan, flat heads, truss heads and others.

Recessed-head screws are tough to make because of the extraordinary demands on the steel wire during multiple heading operations. The wire must have a high degree of hardness. And, *after* it has become even harder from the initial cold heading blows, it must have enough plasticity to take the final indent.

The wire must be free from harmful surface defects. Since the pressures involved alone are sufficient to cause serious splitting with ordinary heading wire, any seaminess can accentuate this problem.

Midland also uses J&L special heading screw wire for other screws with heads that are difficult to form. One of these, made from .133-inch wire, is an indented hexagonal washer head. The washer on the finished screw is .370 inch—or almost three times the diameter of the wire.

For more information on J&L special heading screw wire, call your J&L representative. Or write to Jones & Laughlin Steel Corp., 3 Gateway Center, Pittsburgh 30, Pa.



Midland makes recessed-head screws at rates up to 13,800 per hour on each machine by using J&L special heading screw wire.

The exciting new J&L

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PITTSBURGH, PENNSYLVANIA

Defense Awards: East vs. West

Farwest Fights East's Bid for More Contracts

New Yorkers, out for bigger share of defense work, have asked Congress to change rules for awarding contracts.

But West will oppose idea the government should consider geographic areas before making awards.—By R. R. Kay

▪ Let's not make a WPA out of the nation's defense program. That's the cry from Californians. And they're fighting mad.

New York has a vigorous campaign to pick off defense contracts in hope of relieving its unemployment. Much of this business would normally go to California plants. (See The IRON AGE, Feb. 26, p. 69.)

Who's Involved?—You can count on a bigger, louder battle as the Presidential election nears. The issue is a natural for a political football. Two important national figures are involved: New York's Governor Rockefeller and California's Governor Brown.

New Yorkers have bills in Congress to change the rules for awarding contracts. Senators Javits (R) and Keating (R), authors of S-1383, are leading the fight. The House delegation also introduced bills.

What They Want—All of them read about the same. Main points: (1) The government should consider geographic areas when giving out contracts. (2) The government should give some priority to companies who haven't as yet had much business.

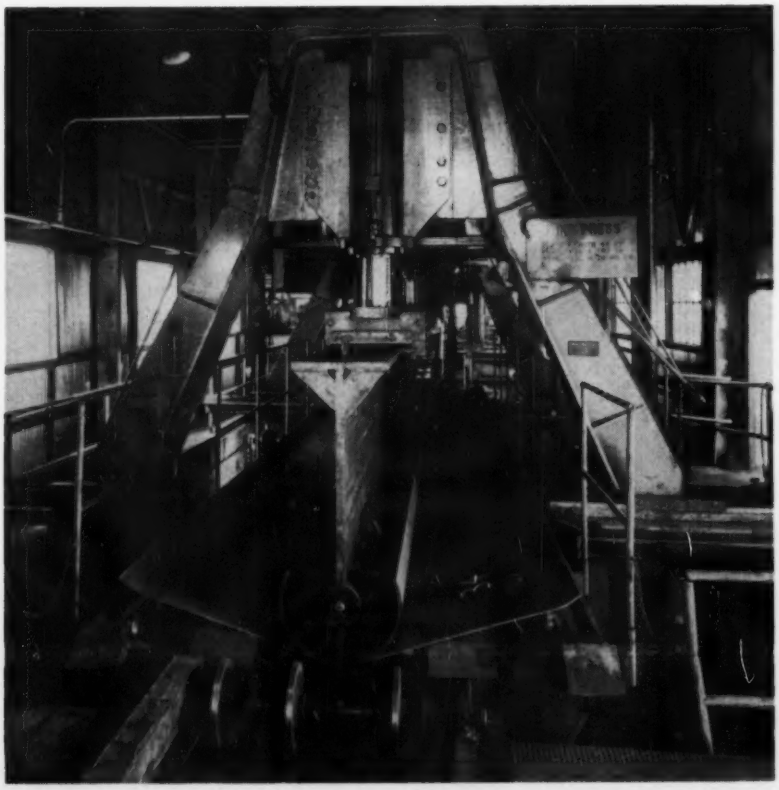
California objects that such a law could make defense contracts into political handouts. Awards could go to firms whether or not they are best qualified or lowest in bid. And bidding on them could be restricted to a specific area.

New Yorkers' strategy: They're reading the riot act to the Defense Dept. to put the fear of God into its procurement officers. But Californians, with strong support from Farwestern and some southern states, will back the Defense Dept. to the hilt.

Kuchel's Views—In Washington, The IRON AGE interviewed Sen. Thomas Kuchel (R-Calif.), the GOP whip. The Senator insists the eastern interests, both political and financial, are barking up the wrong tree. After all, he points out, defense orders should go where the work can be done better, faster, and cheaper.

Senator Kuchel has the full support of the entire West Coast Congressional delegation. It will fight tooth and nail to keep the business.

Plate Shaped Into Pipe in One Minute



FORMING LINE: In making pipe at Kaiser Steel's Fabricating Division plant at Napa, Calif., plate is formed into "U" on this U-ing press. Recent 18-month expansion program has doubled plant's capacity.

HAPPY LATHE SALESMAN:
"This new 50" LeBlond sold for more than $100,000!"
O. W. "DOC" SHULL, Sales Engineer
Technical Equipment Sales Co.
LeBlond Indianapolis Distributors
HAPPY LATHE BUYER:
"We figure our new LeBlond will pay for itself in 3½ years!"
R. O. BERTSCH, Vice President
Bertsch & Co.
Cambridge City, Ind.
SALES MESSAGE:
Having a new LeBlond is a lot better than having the cash. Where else could you get a 30% per annum return on a blue chip* investment? Where else but at your LeBlond Distributor's. See him today!
*LeBlond's lasting value is acknowledged everywhere.
THE R. K. LeBLOND
MACHINE TOOL COMPANY
Cincinnati 8, Ohio
LeBLOND
of Cincinnati

New Way to Make Shell Parts

Company Says Its Flo-Reforming Is Quicker, Cheaper

In a test the process made a part in six steps, compared to 10 in deep drawing, says Floturn Div., Lodge & Shipley.

And savings were reported in time, tooling and materials.—By E. J. Egan, Jr.

▪ Tall, cylindrical, shell-type parts can be formed in fewer operations and at less cost by "Flo-Reforming," says the developer of this new process, Floturn Div., Lodge & Shipley Co., Cincinnati. It has just revealed details of the technique.

There are two stages to the process, which is said to add important metallurgical and cost advantages to parts ordinarily deep drawn.

How It Works—The first stage uses a Floturn machine to form a flat, preformed, or machined blank into a conical shape. The second stage switches the conical workpiece to a regular press. Here it undergoes one or more "Reforming" operations which convert it to a tall, straight-sided cylindrical shell.

How does the new process work out in production? Lodge and Shipley officials cite a typical example: The forming of 500 stainless steel shells 7.125 in. deep, with a 3-in. OD and a wall thickness of 0.042 in. by the new method saves about 28 pct in cost over deep drawing.

Deep drawing these shells involved 10 operations, including shearing, drawing, washing and annealing. Flo - Reforming involves only six operations.

Procedure — To produce the shells, the company starts with flat circular stainless blank. It's 6 and 7/16 in. in diam (including a ⅛-in. trim allowance), and 0.125 in. thick. A No. 12 vertical Floturn machine forms the blank into a cone with a 3-in. diam truncated vertex. This piece is washed and annealed, then reformed into the straight-sided cylinder in a single press operation.

Tooling cost for Flo-Reforming the shells is $1640, compared with $3000 for deep-drawing. Smaller blanks used in the new process also save $114 in material.

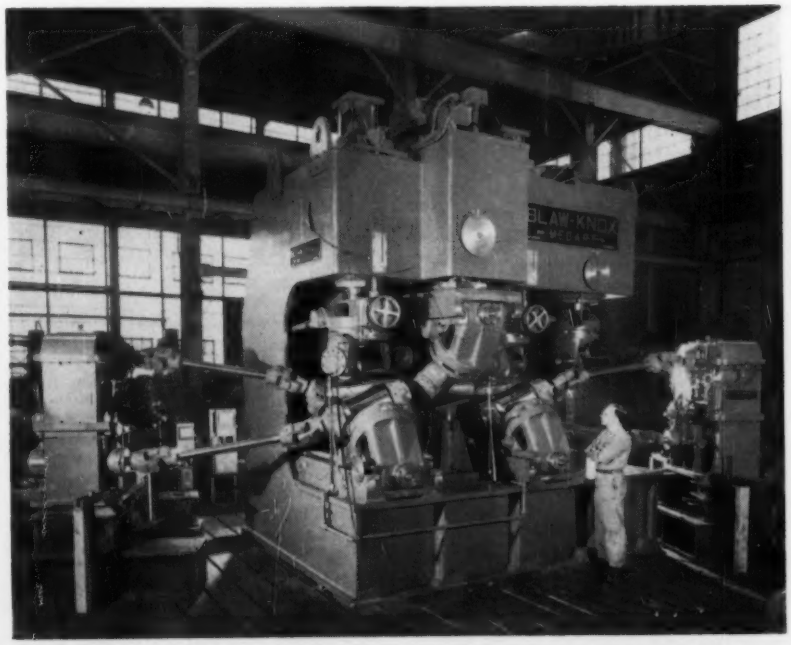
April New Orders

April new orders for metal cutting and metal forming machine tools were the highest for the year to date, according to the National Machine Tool Builders' Assn.

Net new orders for metal cutting machines totaled $40.5 million. This compares with a $22.9 million for April 1958. For metal forming machines the percentage gain was even better; $13 million in net new business as against $5.4 million for the same month last year.

The industry's shipments are just starting to reflect the general pickup in new business that began last November. Backlogs are starting to stretch out, also. Builders of metal cutting equipment have an average of 3.8 months' work on hand at current production rates. For makers of metal forming machines, the average backlog is 4.2 months.

Tubes for Straight Drillers



FOR UNDERGROUND DUTY: Giant Blaw-Knox machine keeps true-circle cross section in thin wall steel tubing for oil well drilling.

INDUSTRIAL BRIEFS

Expansion Completed—Wheeling Steel Corp., completed the improvement and modernization program of its $35 million Yorkville Works. A new $6 million continuous cleaning and annealing line is in production. It has a capacity of 30 net tons per hour, with a nominal speed of 1200 fpm. Yorkville is the company's tin plate producing unit.

Republic's White Elected—Charles M. White, chairman of the board and chief executive officer, Republic Steel Corp., has been elected chairman, National Industrial Conference Board for a term of one year.

Valve Plant—Hunt Valve Co., Salem, O., has begun construction of a new 12,000 sq ft office building to handle orders for its new and improved lines of air and hydraulic valves. New offices will be located on East State St. in Salem, and will connect directly with the new and enlarged plant.

Liquid Oxygen—Air Reduction Pacific Co., Div. of Air Reduction Co., Inc., is building a new $3 million liquid oxygen, nitrogen and argon plant in Richmond, Calif. The plant will produce daily 30 tons of liquid products and will serve the missiles, metalworking and steel industries in the San Francisco Bay area.

Diesel Contract—A $2 million contract for diesel generating equipment has been let to power a U. S. Naval radio station for communication with submerged and surface vessels in the Atlantic area. Contract was awarded by the Continental Electronics Mfg. Co., Dallas, to the Hamilton Div., Hamilton, O., of Baldwin-Lima-Hamilton Corp.

Bethlehem Awards Contract—Bethlehem Steel Corp., awarded the Engineering & Construction Div., Koppers Co., Inc., a contract for rebuilding a 60-oven battery of coke ovens at its Sparrows Point, Md. plant. The corporation has 752 Koppers-built ovens at the Maryland plant and carbonizes about 348,000 tons per month.

Stock Exchange — Lake City Iron & Metal Corp., Buffalo, N. Y., merged with Rochester Iron & Metal Corp., Rochester, N. Y. through an exchange of stock. Lake City will operate as a division of Rochester Iron. Merger includes Super Salvage Systems Inc., a Lake City affiliate, and Buffalo Crushed Steel Corp.

Fairless Library — Benjamin F. Fairless, retired chairman of the board, U. S. Steel Corp., was honored at ceremonies dedicating a library which bears his name. The library, a new addition to the administration building at the Fairless Works, contains awards, honors, books and memorabilia associated with the life of Mr. Fairless.

Electrical Conduit — Pittsburgh Standard Conduit Co., producer of rigid steel electrical conduit, has begun operations in a new $2 million headquarters plant located in Verona, Pa., near Pittsburgh. The plant has 110,000 sq ft of production space and has an annual rated capacity of 42,000 tons of galvanized rigid steel conduit.

Tool and Die Directory — The '59 Directory of Special Tooling Services, is available from the National Tool & Die Mfrs. Assn., 908 Public Square Bldg., Cleveland. It lists more than 1,000 contract tool and die plants in the U. S. and Canada and the categories of service they offer.

Biggest Order—Leeds & Northrup, Philadelphia, has received a $233,000 contract from the U. S. Air Force Materiel Command. The contract represents the largest single order for precision potentiometers and accessories that the company has received in its 60 years in business.

New Furnace — A new 22-ton electric furnace to produce heavy steel castings in addition to gray iron was turned on for the first time at the Goslin-Birmingham Co., subsidiary of Commercial Credit Co., at Birmingham, Ala. The company manufacturers specialized heavy machinery and heretofore had purchased its steel castings.

Fleet Commodore—A new commodore for the Pittsburgh Steamship Div. fleet was named. Thor Nelson, master of the Str. Arthur M. Anderson, was presented the commodore's flag, symbol of the appointment, by Admiral C. R. Khoury, president of this U. S. Steel division.

Dravo Gets Contract — Dravo Corp., Pittsburgh has a contract for eight mill lubrication and coolant systems to be installed at a new rolling mill plant of Mirro Aluminum Co., Manitowoc, Wis. The systems will be equipped with full-flow filtration and automatically controlled heat exchangers.

U. S. Sales Office—Aluminium Limited, Sales, Inc., has opened a resident sales office in St. Louis. The office, at 10 S. Brentwood Blvd., will be managed by R. H. T. Dodson, a resident representative for Aluminium Limited Sales Inc., American sales subsidiary of Aluminium Ltd.

New completely equipped EF RESEARCH BUILDING

View of One Bay in the New Research Building Showing the Continuous Strip and Bell Furnaces.

to develop and test improved heat treating techniques benefitting all metal producers and fabricators . . .

From the company's earliest beginning research has been traditional at The Electric Furnace Co.

Now, our facilities are much enlarged. The entirely new building is 80 ft. wide x 180 ft. long. Equipment includes a continuous strip furnace suited for processing at various cycles; bell, wire mesh belt, batch and pusher furnaces, with and without forced circulation; vacuum furnaces for batch or continuous operation; endothermic and exothermic generators; ammonia dissociators; atmosphere refrigerators; adsorption type gas dryers; CO_2 scrubbers, and completely equipped chemical and metallurgical laboratories.

From these new facilities will come improved techniques for treating familiar materials, and new techniques for treating the newer metals of the jet and space age;— also expanded testing of critical materials used in our furnaces, to maintain our unsurpassed standards of quality and performance.

As in the past, our research facilities will be available to metal producers and processors, for development and test work, conducted, if desired, in the presence, and with the assistance of your own technicians and production men.

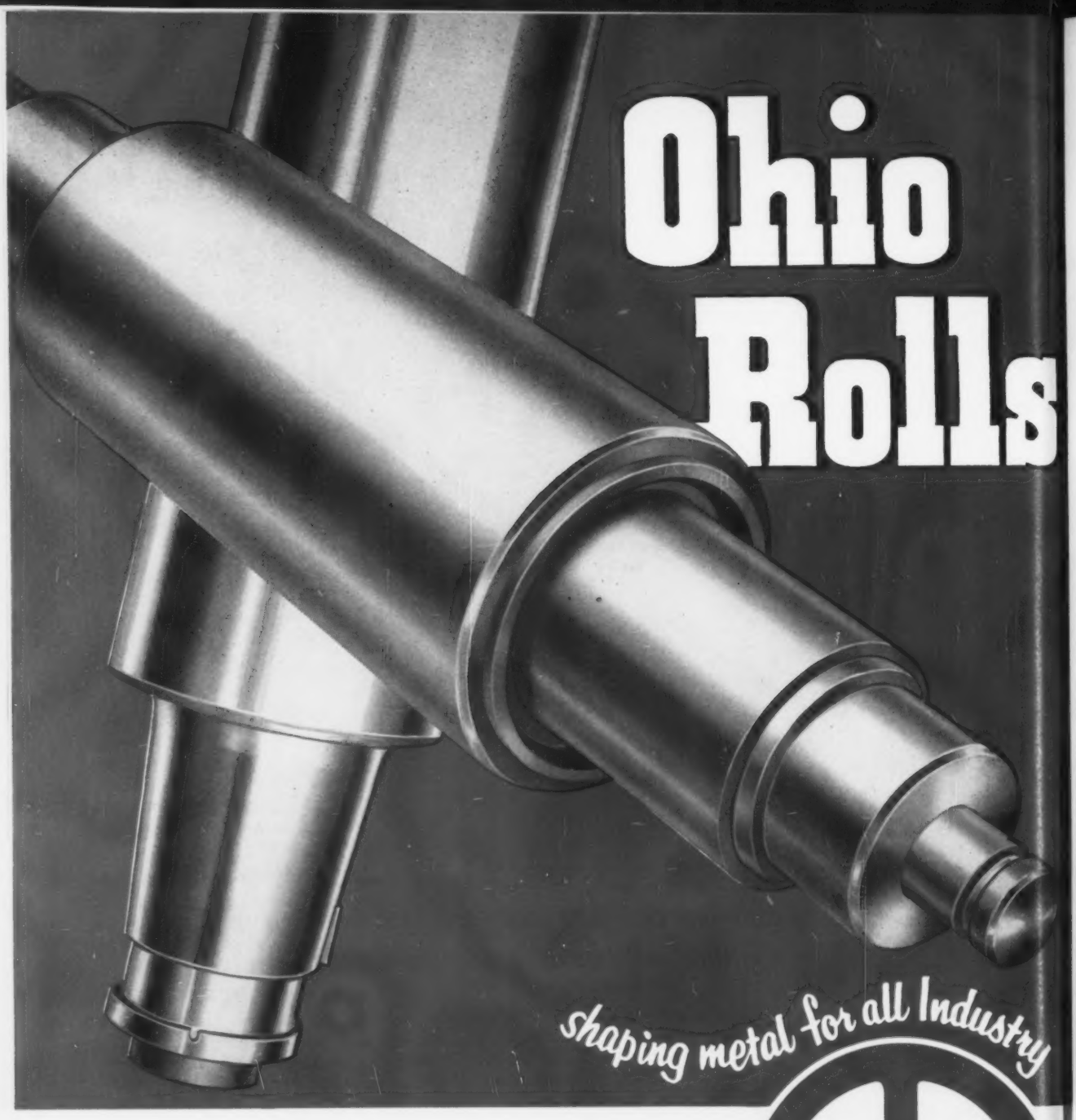
This completely modern laboratory is as close to you as your telephone. Feel free to use it frequently!

THE ELECTRIC FURNACE CO.

Gas-fired, Oil-fired and Electric Furnaces for Heat Treating any Product, Using any Process, any Hourly Output.

400 West Wilson Street *Salem - Ohio*

Branch Offices in Detroit, Mich., Santa Ana, Calif., and Cheshire, Conn. Canadian Associates, Canefco Limited, Toronto 13, Ontario



OHIO IRON AND STEEL ROLLS

Carbon Steel Rolls
Ohioloy Rolls
Ohioloy "K" Rolls
Nioloy Rolls
Flintuff Rolls
Double-Pour Rolls
Chilled Iron Rolls
Forged Steel Rolls
Denso Iron Rolls
Nickel Grain Rolls
Special Iron Rolls

The Ohio Steel Foundry Co.

LIMA, OHIO

LIMA... Virtually at the center of the steel industry

PLANTS AT LIMA AND SPRINGFIELD, OHIO

Bryant Chucking Grinder Co., subsidiary of Ex-Cell-O Corp.—**H. G. Bixby,** elected president.

Borg - Warner Corp., Marvel-Schebler Products Div. — **A. B. Pulliam,** appointed president and general manager.

Dupont, Inc.—H. E. Kirkpatrick, named executive vice president.

Minneapolis - Honeywell Regulator Co., Datamatic Div. — **T. H. Armstrong,** named vice president, marketing.

Foote Mineral Co.—B. E. Cass, named general sales manager, and **A. C. Demos,** promoted to manager, metallurgical sales.

General Electric Co.—W. J. Dugan, Jr., appointed manager, rubber market development, Silicone Products Dept.

U. S. Steel Corp., National Tube Div.—**J. W. Lindquist,** appointed manager, standard pipe products.

Jessop Steel Co.—G. A. Schriber, named manager, sales, Pittsburgh district.

Jones & Laughlin Steel Corp., Stainless and Strip Div.—**K. E. Lewis,** appointed division quality and process control manager, Detroit.

General Motors Corp., AC Spark Plug Div.—**K. T. Kitchin,** appointed sales manager, commercial products.

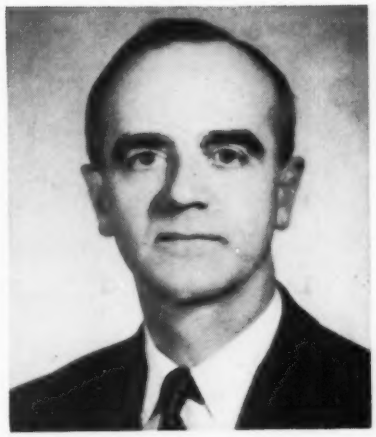
Kaiser Aluminum & Chemical Sales, Inc. — D. W. Fenton, appointed sales branch manager, Toledo, O.

Jones & Laughlin Steel Corp., Accounting Services Div.—**W. N. Merchant,** appointed supervisor.

Cincinnati Gilbert Machine Tool Co.—J. W. Daughters, appointed sales manager.

Cleaver - Brooks Co.—T. B. Mansfield and **R. D. Pennstrom,** named regional managers.

The A. F. Holden Co.—R. H. Church, named director of research.



Bryant Chucking Grinder Co., subsidiary of Ex-Cell-O Corp.—**N. A. Leyds,** elected vice president and general manager.

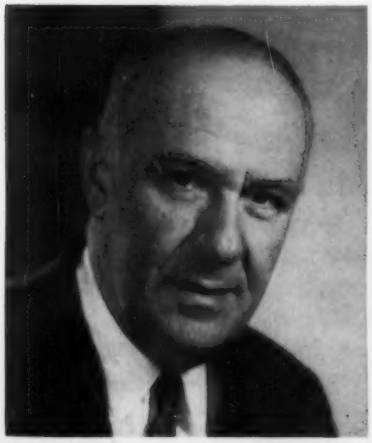
Kennecott Copper Corp.—W. F. Macklaier, elected to the board of directors.

Ford Motor Co.—M. D. Hill, elected a vice president.

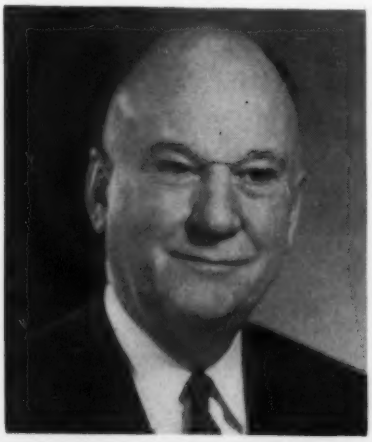
The Union Twist Drill Co., The Butterfield Div.—**J. T. McFadzean,** appointed assistant sales manager.

Chrysler Corp., Chrysler Marine and Industrial Engine Div.—**O. H. Vandeputte,** named manager, mar-

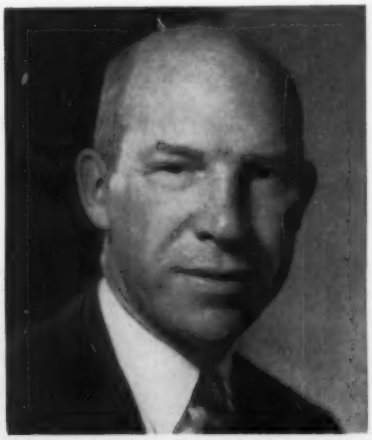
(Continued on P. 118)



Jones & Lamson Machine Co.—H. H. Whitmore, elected executive vice president.



Jones & Lamson Machine Co.—J. C. Hebert, elected vice president.



Jones & Lamson Machine Co.—R. S. Jones, named general manager.

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CIRCLE ROLLS
for every purpose

Uniform performance, high production and long service are unfailing characteristics of these better rolls.

Preferred by leading mills throughout the nation for more than half a century.

Yes, there's a Red Circle Roll for every purpose.

ROLLS

Nickel Alloy Grain Rolls
Grain Rolls
Chilled Rolls
Nickel Chilled Rolls
Moly Rolls
Nodular Iron Rolls

All Grades Nickel Alloy Iron Rolls for Hot and Cold Rolling

Hyde Park
FOUNDRY and MACHINE CO.
HYDE PARK
Westmoreland County, Pa.

Rolls
Rolling Mill Equipment
Gray Iron Castings

(Continued from P. 117)

keting staff, and **L. A. Peaslee,** named Industrial Engine sales manager.

International Business Machines Corp. — R. L. Palmer, appointed assistant director for engineering on the staff of the vice president, research and engineering.

The Cincinnati Milling Machine Co.—P. W. Crane, elected vice president.

Worthington Corp.—F. O. Snyder, appointed manager, Cincinnati, O., district sales office.

Inland Steel Co.—W. A. Kingsley, appointed assistant manager, Chicago district sales office.

The Falk Corp.—H. J. McCulloch, appointed manager, personnel relations, and **A. W. Libby,** manager, personnel development.

National Research Corp.—J. H. Moore, named a member of the board of directors.

Cincinnati Milling & Grinding Machines, Inc., sales subsidiary of Cincinnati Milling Machine Co.—**R. A. Didday,** elected vice president.

Bucyrus-Erie Co.—F. B. Shew, appointed manager, sales, commercial cranes and excavators.

U. S. Steel Corp.—R. W. Claypoole, named manager, railroad products section.

Pangborn Corp.—J. E. Martin, appointed district manager, Cleveland.

Strategic Materials Corp.—G. N. Moga, named vice president.

Chrysler Corp.—J. R. Longon, appointed assistant managing director, Chrysler International, S. A., Geneva, Switzerland.

Republic Steel Corp. — W. B. Belden, appointed secretary and **H.**

(Continued on P. 121)

These workpieces get the "Touch of Gold" in this barrel

... Because greater value is added to each product as it is finished with Norton TUMBLEX* abrasives. Let us show you how this "Touch of Gold" can save you money and perform your barrel-finishing and your polishing operations better.

Send in your parts to our Sample Processing Department. We'll finish them using the latest type of tumbling equipment ... selecting the correct abrasive from our complete line ... and give you a detailed report on methods and equipment.

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PRODUCTION
of
GREY IRON CASTINGS

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LARGEST AND MOST MODERN
PRODUCTION FOUNDRIES

ESTABLISHED 1866

THE WHELAND COMPANY
FOUNDRY DIVISION

MAIN OFFICE AND MANUFACTURING PLANTS
CHATTANOOGA 2, TENNESSEE

(Continued from P. 118)

A. Law, Jr., assistant treasurer, and **Gordon Meldrum,** appointed asst. chief metallurgist, Central Alloy District.

General Motors Corp., Central Foundry Div.—**C. A. Koerner,** appointed director, sales and engineering.

General Motors Corp., Central Foundry Div.—**E. E. Braun,** appointed manager, ferrous metals operations.

U. S. Steel Corp., Oil Well Supply Div.—**J. P. O'Toole,** appointed eastern area manager at Columbus, O.

Allied Chemical's General Chemical Div.—**J. E. Kelley,** appointed assistant manager, sales, New York executive office.

Crucible Steel Co. of America—**J. F. O'Hara,** named eastern regional sales manager.

Ferro Corp., Furnace Engineering Div.—**A. B. Kimpel,** appointed West Coast sales and service engineer with headquarters in Los Angeles.

General Motors Corp., Fisher Body Div.—**R. F. Smith,** appointed manager, Fisher Body stamping plant in Cleveland; **G. J. Bates,** appointed manager, Grand Blanc, Mich. plant; **L. J. Lamm,** appointed production manager, Cleveland stamping plant.

Eaton Manufacturing Co., Reliance Div. — **P. A. Miller,** appointed general manager, and **C. A. Sellen,** will become head of the Division's expanded steel sales program.

Robertshaw-Fulton Controls Co.—**E. H. Furstenau,** elected assistant secretary.

L. B. Foster Co.—**G. E. Willenberg,** appointed Detroit district sales representative.

Stamco

slitting and coiling line

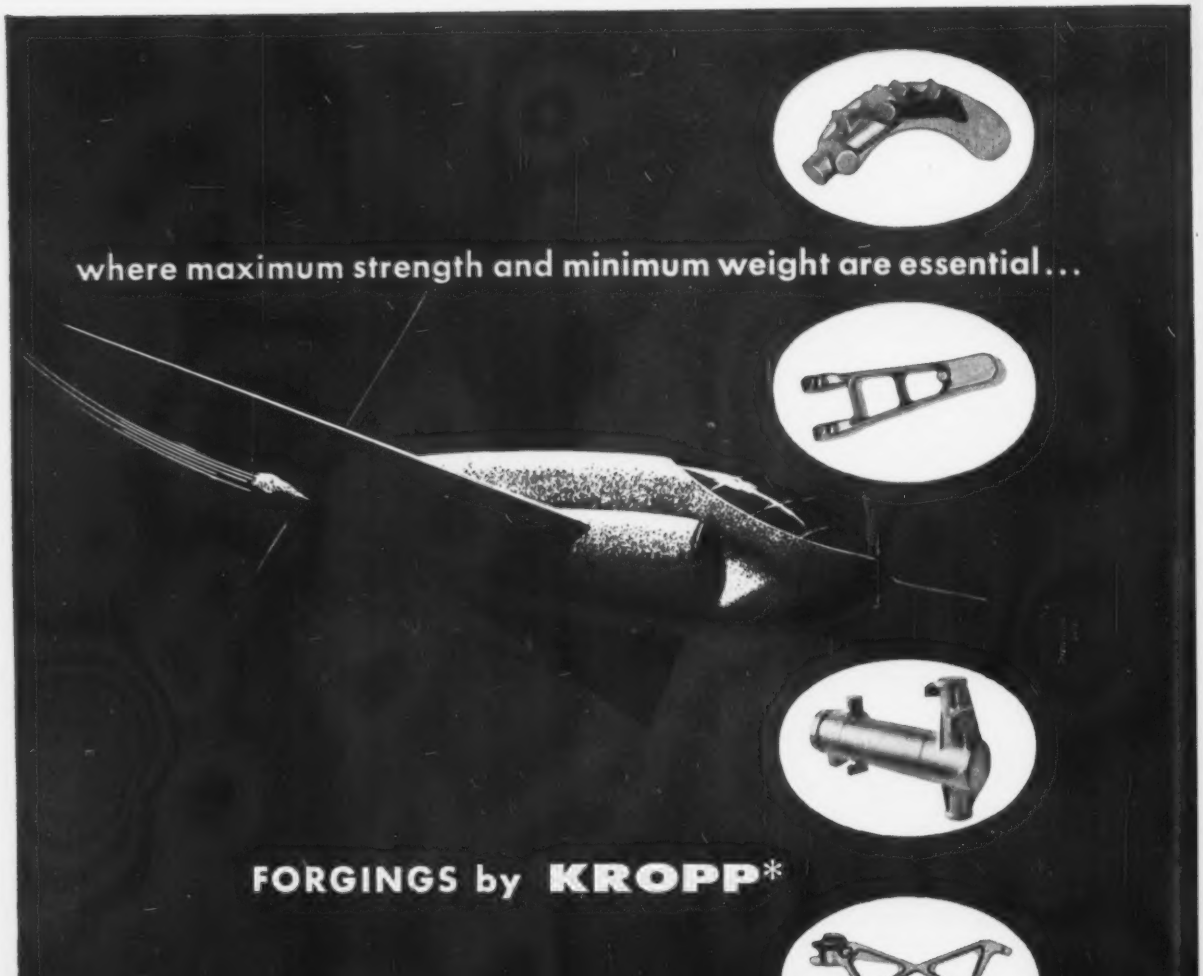
saving time and material in west coast installation

UTILITY APPLIANCE CO., of Los Angeles

now has line to handle 20,000 lb. coils up to 48" wide and gauges up to ⅛ inch. Low investment—long life—make this a wise move toward reducing operating costs.

Stamco, Inc., New Bremen, Ohio, U.S.A.

Slitting and Coiling Lines • Cut-To-Length Lines • Flying Shear Lines • Power Squaring Shears • Automatic Resquaring • Corrugating • Culvert • Steel Mill Equipment



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Industrial Finishing Show Coming to Detroit

▪ The Motor City will host the 5th Industrial Finishing Exposition, sponsored by the American Electroplaters' Society, in conjunction with its Golden Jubilee Convention and International Conference on Electrodeposition and Metal Finishing. The Exposition, featuring exhibits by leading suppliers to the metal-finishing industry, will be staged in the Detroit Artillery Armory from Tuesday, June 16, through Friday, June 19, from 10 a.m. onward each day. The technical conferences and the social activities of the AES will take place largely within the various facilities of the Hotel Statler-Hilton, except for certain meetings at the Armory, from June 14 through 19.

The IRON AGE Metal Cleaning and Finishing Handbook, published in connection with the Finishing Show, immediately follows this article.

Below is the conference schedule, with a list of Exposition exhibitors following:

INTERNATIONAL CONFERENCE ON ELECTRODEPOSITION AND METAL FINISHING

Sessions

Mon., June 15—2:00 p.m.

Chairman: Dr. T. P. Hoar, England.

The William Blum Lecture—Education and the Electroplating Industry, by Dr. William Blum, U. S.

Problems Encountered in the Application of Pre-Finished Metal, by Dr. S. Wernick, England

Development and Application of Ultrasonic Cleaning, by J. Zucker, Switzerland.

Experimental Studies of the Electrodeposition of Metals in Narrow Crevices, by Dr. Henry Leidheiser, Jr., and Mrs. Lucille B. Garmon, U. S.

Tues., June 16—9:00 a.m.

Chairman: G. Ross Davidson, Canada.

A Black Chromium Plating Process, by Dr. A. Kenneth Graham, United States.

Leveling Power of Copper Sulfate Baths with Complexing Addition Agents, by Dr. Eugenio Bertorelle, Dr. I. R. Bellobono, and Dr. A. Scarati, Italy.

Plating Zinc on Steel from Pyrophosphate Solution—A Pilot Plant Investigation, by U. F. Marx and Dr. Povey, England.

Electrodeposition of Nickel Alloys from the Pyrophosphate Bath, by Dr. T. L. Rama Cher, India.

Chairman: Leslie L. Diveley, United States.

Chemical Conversion Coatings, by Robert F. Ayres, United States.

The Metal Surface Conversion Coating as a Paint Base, by Dr. Robert C. Gibson, United States.

The Accelerated Weathering of Organic Finishes, by A. A. B. Harvey, England.

Surface Texture, Its Influence on Organic Finishing, by Dr. Walter Stein and D. H. Lloyd, England.

2:30 p.m.

Chairman: William M. Phillips, U. S.

The Influence of the Physical Metallurgy and Mechanical Processing of the Basis Metal on Electroplating—Ferrous Metal Conditions Affecting the Durability of Watts Nickel Deposits, by Dr. Maurice H. Jones, Chih-Yeu Lu, A. F. Mohenheim, and J. Zajdowski, Canada.

The Mechanism of Mechanical Polishing as Related to the Nature of Polished Surfaces, by L. E. Samuels, Australia.

Outdoor Corrosion Results with Chromium-Nickel-Chromium Plate, by Dr. Henry Brown and Max Weinberg, U. S.

Improved Corrosion Resistance for Electroplated Zinc Die Castings, by Dr. Charles L. Faust, Hugh R. Miller, and William H. Safrenek, U. S.

Wed., June 17—9:00 a.m.

Chairman: Clarence H. Sample, U. S.

Corrosion Testing of Electrodeposited Coatings, by F. L. LaQue, U. S.

Experience with the Use of the Corrodkote Test, by Donald M. Bigge, U. S.

Sulfur Dioxide Accelerated Corrosion Test — Testing Conditions and Equipment, by Dr. J. Edwards, England.

Experience with the Use of the Accelerated Acetic Acid Salt Spray Test, by Cleveland F. Nixon, U. S.

Chairman: Ralph D. Wysong, U. S.

Water-Soluble Coatings for Metal Finishing, by Robert A. Boller, U. S.

Epon Resins in the Electroplating Industries, by H. W. Howard, U. S.

Vinyl Dispersions: Their Use in Metal Finishing, by Myron Perez, U. S.

PROGRAM

Thurs., June 18—9:00 a.m.

Chairman: Dr. S. Wernick, England.

The Effect of Flow Rate and Current Density on the Electrolytic Removal Rate of Iron and Copper from a Watts Nickel Solution, by Dr. Abraham M. Max and M. L. Whitehurst, U. S.

Chromium in Cyanide Solutions and Its Removal, by Dr. Erich Laue, U. S.

Electroless Copper Plating, by Dr. Edward B. Saubestre, U. S.

Some Aspects of the Corrosion of Decorative Plated Coatings, by Dr. Frederick A. Lowenheim and William H. Rowan, U. S.

2:30 p.m.

Chairman: Ezra A. Blount, U. S.

European Bright Anodizing Practice, by A. W. Brace, England.

Hydration of Anodic Oxide Films, by M. S. Hunter, P. F. Towner, and D. L. Robinson, U. S.

Anodizing Processes for the Production of Very Thick Alumina Films, by R. Segond, P. Lelong, and J. Herenguel, France.

Developments in the Surface Treatment of Aluminum — Processes and Materials, by Dr. Richard Lattey, Germany.

Fri., June 19—9:00 a.m.

Chairman: A. W. Wallbank, England.

Electrochemical Technique in Modern Metallography, by Dr. Pierre A. Jacquet, France.

The Present State of Electrolytic Polishing in Europe, by Robert Mondon, France.

The Effect of Shot-Peening and of Grinding on the Fatigue Strength of Chromium Plated High Strength Steel, by R. A. F. Hammond and C. Williams, England.

Some Chemical Polishing Processes—Their Mechanism and Their Application, by Dr. H. Spahn, Germany.

Influence of Various Surface Treatments on the Resistance to Fatigue at High Temperature of Two Aluminum Alloys, by Gaetan Ab Abadie and Georges Vidal, France.

Chairman: A. A. B. Harvey, England.

The Effect of Steel Pretreatments on the Performance of Water Thinned Coatings, by R. A. Williams, U. S.

Vinyls in Modern Industrial Coatings, by W. H. McKnight, U. S.

Protecting Silver and Copper Against Tarnishing by Means of a Chromate Passivating Process, by Dr. P. Baeyens and J. L. Melse, Holland.

Chromic Acid Anodizing Characteristics of Wrought Aluminum Alloys, by George E. Best, J. G. Hecker, Jr., John W. McGrew, and R. V. VandenBerg, U. S.

2:30 p.m.

Chairman: Dr. Abner Brenner, U. S.

Barrel Plating with Special Consideration to Protection of Thread Diameters, by A. W. Wallbank, England.

Ductility in Plated Coatings, by Dr. Harold J. Read and Thomas J. Whalen, U. S.

Grain Size Control in Electroforming, by H. Denis Hughes.

Electrodeposits as Resists in Selective Heat Treating, by R. Scott Modjeska and Simon P. Gary, U. S.

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American Optical Co.	296
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TABLE 1 SPOT TEST IDENTIFICATION OF METAL SURFACES

SEQUENCE "A"

Sequence "A" is for testing white metals when it is not certain whether they are surface treated or not

Place a drop of the specified solution on the metal for 0.5 min.

1. Hot 20 pct NaOH	Violent Reaction May Be Al	Add Nitric Acid	No Reaction	ALUMINUM
	Slight Reaction May Be Zn		Colorless Reaction	ZINC
	No Reaction	Proceed to (2)		
2. Concentrated HCl and transfer the reaction product to a filter paper and add a drop of a solution of 2.7 oz H_2SO_4 1.3 oz Potassium Ferricyanide Per Gal of Water	Blue Spot	Iron Content and Test for Nickel and Chromium		STAINLESS STEEL
3. Concentrated HCl and Colorless or Red Reaction. Transfer the reaction product to a filter paper and add an excess of Ammonia	Blue Reaction	Copper Content (Test for Nickel)		Monel or White BRASS
4. 20 pct HF	Yellow Reaction	(Check for Silver)		SILVER
	Slight Reaction			MAGNESIUM

SEQUENCE "B"

Sequence "B" is for testing white plated surfaces

Place a drop of the specified solution on the metal for 0.5 min.

1. Concentrated HCl, Green Reaction. Transfer reaction product to a filter paper and add Ammonia and Dimethglyoxime	Colorless Spot	CHROMIUM
	Red-Pink Spot	NICKEL
2. Concentrated HCl, Colorless Reaction. Transfer reaction product to a filter paper and treat the reverse side of the paper with powdered Cacotheline	Violet Spot	TIN
3. No Color From Test (2), then place a drop of Concentrated HNO_3 and transfer reaction to a filter paper and add Ammonia and Sodium-Sulfide	White Spot	ZINC
	Yellow Spot	CADMIUM
4. Brown or Black Reaction in Test (3), then transfer the reaction product to a filter paper and add NaOH	White Spot	LEAD
	Brown-Black Spot	SILVER
5. Concentrated Aqua Regia	No Reaction	RHODIUM
	Dissolves	PLATINUM

Concentrated Nitric Acid will affect neither

SEQUENCE "C"

Sequence "C" is for yellow and colored metal surfaces

Apply an open flame to the "colored" metal surface

Carbonized or Softened	LACQUERED or PAINTED

To Unaffected Surface Add a Drop of Concentrated HNO_3

No Reaction	GOLD
Blue Reaction	COPPER or BRASS
Violet Reaction	Dyed or Treated MAGNESIUM
Colorless Color Faded	Dyed or Treated ALUMINUM

But No Reaction on Metal

THE IRON AGE, June 4, 1959

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TABLE 2 PHOSPHATE SURFACE TREATMENTS

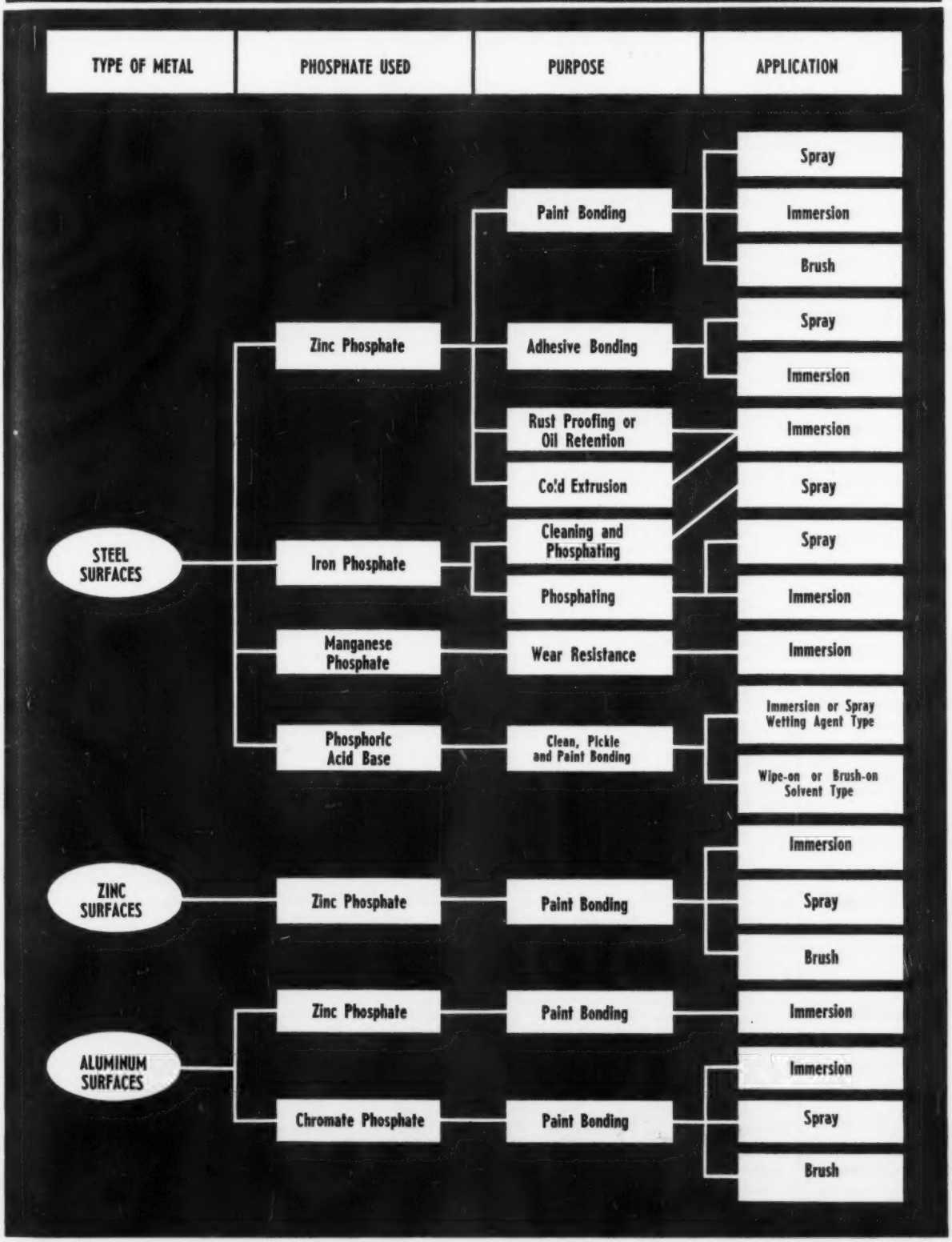

TABLE 3 SURFACE TREATMENT OF ALUMINUM ALLOYS

TREATMENT	PURPOSE	FOR USE ON	OPERATION	FINISH and THICKNESS
Sulphuric Acid Anodizing	Corrosion and abrasion resistance and when dyed, as a decorative coating.	Primarily wrought alloys and extrusions for autos, buildings, appliances, etc.	10-60 min., 12-15 amps/sq. ft., 15-20 volts, 68-70°F. temperature controlled plus or minus 1°, tank of stainless steel, rubber lined, plastic lined, or lead lined. Aluminum or titanium racks.	Hard, dense, 0.0001 to 0.001 in. thick, can be dyed many colors, good salt spray resistance.
Chromic Acid	Paint base, corrosion resistance.	All alloys except those with more than 5 pct copper.	30-40 min., 1-3 amps/sq. ft., 40 volts, 95°F., pH-0.5, steel tank, aluminum racks.	0.00006-0.00009 in. thick, colored by the process, color depends on the alloy.
Chromate Conversion Coating	Paint base, decorative effect, corrosion resistance.	All alloys.	Spray, dip, or roll on, 15 sec. to 2 min., room temperature, stainless steel tanks.	Thin film, vary in color from clear to brown, for paint base should be light gold and not powdery.
Phosphate Conversion Coating	Paint base and decorative.	All alloys.	Spray, dip, or roll on, 15 sec. to 2 min., room temperature, stainless steel tanks.	Thin film, vary in color from clear to green.
Organic Coatings	Decorative and protective coatings can be applied prior to forming.	All alloys.	Teat with chromate or phosphate conversion coating or roughen surface, apply organic coating by dip, spray, roll, brush, flow coating. May be baked or air dried.	Matte or gloss as desired, decorative coatings 0.5 to 2.5 mils thick, any color, protective coatings several mils thick.
Porcelain Enamel	Decorative coatings	6061, 1100, 3003, EC, high purity.	Treat surface, spray on glass-like frit, fire at 900°-1000°F.	Many colors, abrasion and corrosion resistance, .007-.025 inches thick.
Hard Coat Anodize (Patented Process)	Abrasion resistance	Most wrought alloys and many casting alloys.	Sulphuric acid with additive, temperature 0-35°F., 40 volts.	1 to 2 mils thick coatings are colored depending on alloy.
Electro-Polish	Increase smoothness and brilliance.	Primarily high purity alloys and alloys clad with high purity aluminum.	Patented process, 5-15 min., less than 120°F., conditions depending on patent.	Smooth brilliant surface.
Chemically Brighten	Increase smoothness and brilliance.	Primarily 5357, 5457, 6063, 5005, 3003, 6463, and high purity or alloys clad with high purity.	Phosphoric and nitric acid at 200°F., sometimes small additions of copper and wetting agents, patented process.	Smooth brilliant surface.
Zinc Immersion Plating	Preplate for subsequent plating, improve solderability.	Many alloys.	Clean thoroughly, then dip for 30 sec. to 2 min., 60 to 85°F., agitate, steel or rubber lined tank, rinse thoroughly before further plating.	Thin film.
Electroplating	Decorative or protective coatings.	Most alloys after proper preplating.	Usually a copper strike, then proceed by conventional methods.	Same as on other metals.

Courtesy Reynolds Metals Co., Richmond, Va.

TABLE 4 CHEMICAL TREATMENTS FOR MAGNESIUM ALLOYS

Dow No.	Treatment		Specification (1)		Alloys on Which Treatment May Be Used	Appearance	Approx. No. of Steps Including Rinses	Approx. Total Time in Treating Baths Minutes	Uses	Remarks
	Name	Type	MIL Aero	AMS						
1	Chrome-Pickle	Chemical	MIL-M-3171 Type 1	2475	All alloys	Matte gray to yellow red	5	6	General purpose treatment; good paint base	Simple, inexpensive dip treatment; slight dimensional loss
4	Chrome-Alum	Chemical	—	—	Die cast R	Brown-black	6	10	Black decorative finish for die castings	Improves paint adhesion
7	Dichromate	Chemical	MIL-M-3171 Type 3	2475	All commercial alloys except M, EK30A, EK41A, and HK31XA	Brown	7	45	Provides best combination of paint base and protective qualities	Does not materially affect dimensions. Requires ½ hour or more in boiling solution
8	Alkaline Dichromate	Chemical	—	—	All commercial alloys except M, EK30A, EK41A and HK31XA	Brown-black	9	45	Used for black finish on all forms. More protective on die castings than #4	Has protective and paint base qualities. Requires boiling in solution ½ hour or more
9	Galvanic Anodize	Electro-chemical	MIL-M-3171 Type 4	—	All alloys	Black	7	30	Used on Dowmetal M in place of #7 or #8. Also any other non-aluminum-containing alloys not treatable in #7 or #8	Requires galvanic couple between work and steel tank or steel cathode plates if tank is ceramic lined
10	Sealed Chrome-Pickle	Chemical	MIL-M-3171 Type 2	—	All alloys	Similar to #1	7	35	Alternate for #7 when dimensional loss can be tolerated	Improved protection over #1 due to boiling 30 min in dichromate bath
12	Caustic Anodize	Electro-chemical	MIL-M-3171 Type 5	—	All alloys	Light shades of gray and tan	5 to 8	30	Combines decorative finish with abrasion resistance and protective value	Can be dyed. Neutralizing seal gives it paint base equal to #7
14	a-c Anodic	Electro-chemical	—	—	All alloys	Light gray to white	4 to 7	25	Most abrasion resistant when given a neutralizing seal. Can be painted	Covers flow marks in die cast surface. Should be waxed to prevent smudging
15	Bright Finish for Wrought	Chemical	—	—	Dowmetals FS1, J1, M, O1 and ZK60A	Silvery	5 to 7	10	Decorative finish. Used only on wrought magnesium	Good "shelf life" appearance. Dimensions slightly affected by treatment
16	Bright Finish for castings	Chemical	—	—	Dowmetals C, H, R and AZ91C	Silvery	4 to 7	7	Decorative finish. Used only on magnesium castings	Appearance similar to #15, good "shelf life," slight dimensional change
17	Anodize a-c or d-c	Electro-chemical	Proposed	2478	All alloys	Clear, light gray or green	5	5-15	Protective and decorative finish	Best abrasion resistance, best paint base and most consistent Dow treatment
	Manodyz (2)	Electro-chemical	MIL-M-3171 Type 5	—	d-c: castings and intricate shapes, except on M alloys a-c: FS-1, JS-1, M, all cast alloys	d-c: green a-c: black	10	30	Paint and bonding base. Moderate abrasion and corrosion resistance	Can be dyed. Protection higher than some non-electrolytic finishes
	HAE (3)	Electro-chemical	MIL-C-13335	2476	All alloys	Brown	—	—	Exceptionally high corrosion, abrasion and heat resistance, good insulating properties	Available by permission
	Iridite #15 (4)	Chemical	—	—	All alloys	Light to dark	3-7	15-30 sec	As final finish in absence of abrasion or where surface must be electrically conductive, paint base	Can be dyed. Must be thoroughly rinsed.

(1) MIL Aero—Military Aeronautical Standards.
AMS—Aircraft Material Specifications of SAE.
(2) Consolidated-Vultee Aircraft Corp. Patent 2,497,036.
(3) Obtain further information from Pitman-Dunn Laboratories, Frankford Arsenal, Phila. 37, Pa.
(4) Proprietary brand of Allied Research Products, Inc., Baltimore, Md.

Table courtesy The Dow Chemical Co., Midland, Mich.

CLEANING AND PICKLING

TABLE 5

NO.		CONSTITUENT	SPECIFIC GRAVITY	Temp., °F	oz/gal	fl oz/gal
STEEL	1	Hydrochloric acid	1.18	Room	—	64
	2	Sulfuric acid	1.84	80-175	—	8
	3	Phosphoric acid (85%)		175-190	—	15
	4	Sulfuric acid	1.84	Room	—	8
		Hydrochloric acid	1.18		—	12
CAST IRON	1	Sulfuric acid	1.84	Room	—	16
		Hydrofluoric acid (48%)			—	16
	2	Sulfuric acid	1.84	Room	—	12
		Nitric acid	1.41		—	4
		Zinc oxide			1	—
	3	Citric acid		Room	14	—
COPPER AND BRASS	1[a]	Sulfuric acid	1.84	80-150	—	14
	2[b]	Sulfuric acid	1.84	80-100	—	32
		Nitric acid	1.41		—	16
COPPER AND BRASS FINISHING DIPS (not to be used before plating)	1	Chromic acid		70-80	10	—
		Sulfuric acid	1.84		—	32
	2	Sodium dichromate		125-140	4	—
		Sulfuric acid	1.84		—	6-8
	3	Nitric acid	1.41	140-160	—	64
		Sulfuric acid	1.84		—	64
BERYLLIUM COPPER	1	Sulfuric acid	1.84	150	—	64
ZINC-BASE DIECASTINGS	1	Sulfuric acid	1.84	Room	—	1
LEAD AND ITS ALLOYS; PEWTER	1	Fluoboric acid (48%)		Room	—	12
	2	Acetic acid (99%)		Room	—	12
		Hydrochloric acid	1.18		—	12
ALUMINUM AND ITS ALLOYS	1[c]	Sulfuric acid	1.84	Room	—	73
		Nitric acid	1.41		—	47
		Sodium chloride			(4g/gal)	—
	2[d]	Nitric acid	1.41	Room	—	96
		Hydrofluoric acid (48%)			—	32
Electrolytic Pickling						
STEEL (before nickel plating)	1[e]	Sulfuric acid	1.84	80-100	—	90
STEEL (scaled)	1[f]	Sulfuric acid	1.84	180	—	4
		Sodium bisulfate			16	—

[a] This is the most common dip for copper and its alloys. If copper is to be plated in a fluoborate solution, fluoboric acid may be used in place of sulfuric acid.

[b] This dip is used to remove fire scale. If action is too rapid, decrease water and increase acid content.

[c] This is used to remove smut and requires but 3 to 5 sec.

[d] This is used to remove films from the surface of aluminum castings and other aluminum forms. The solution must be ventilated, and the operator must wear rubber gloves when working above the tank. The only practical lining is graphite brick.

[e] Work is anodic at 60 asf; lead cathodes. When this dip is used on low-carbon steels, the time of immersion should be limited to ½ to 1 min. For high-carbon steels, the time for immersion should be limited to 15 sec.

[f] Work is anodic at 3 to 4 v; hard-carbon cathodes.

From Handbook of Practical Electroplating by T. M. Rodgers (Macmillan)

TABLE 6 TYPICAL IMMERSION CLEANING OPERATIONS

Metal	Bath	Temp., °F	Time, Mins.	Operating Data
ALUMINUM	3-8 oz/gal Caustic soda	120–180	2–10	Etching cleaner
ALUMINUM	4 oz/gal Metasilicate 4 oz/gal Soda ash	160–180	2–10	Non-etching cleaner
BRASS	4 oz/gal Sodium orthosilicate 2 oz/gal Soda ash	160–180	2–5	
COPPER	6–8 oz/gal Sodium orthosilicate	160–210	2–10	
MAGNESIUM	8 oz/gal Sodium orthosilicate	160–210	2–10	
NICKEL	4 oz/gal Sodium orthosilicate 2 oz/gal Soda ash	160–210	2–10	
STEEL	8 oz/gal Sodium orthosilicate	180–210	2–10	
STEEL	6 oz/gal Sodium orthosilicate 2 oz/gal Trisodium phosphate	180–210	2–10	
STEEL	4 oz/gal Caustic soda 4 oz/gal Trisodium phosphate	180–210	2–10	
ZINC	4 oz/gal Metasilicate 4 oz/gal Soda ash	140–180	1–5	

Note: These baths are not intended to represent commercial baths, since these may contain soaps, surfactants, water treating chemicals, inhibitors, etc. Rather, these show the basic chemicals which are used in these operations.

TABLE 7 TYPICAL SPRAY CLEANING OPERATIONS

Metal	Bath	Temperature, °F	Time, Minutes
ALUMINUM	½–1 oz/gal Metasilicate ½–1 oz/gal Soda ash	140–170	½–2
BRASS	½–1 oz/gal Sodium orthosilicate ¼–½ oz/gal Soda ash	140–170	½–2
COPPER	1–2 oz/gal Sodium orthosilicate	140–170	½–2
MAGNESIUM	1–2 oz/gal Sodium orthosilicate	140–170	½–2
NICKEL	1–2 oz/gal Sodium orthosilicate	140–170	½–2
STEEL	½–2 oz/gal Sodium orthosilicate	140–180	½–2
STEEL	½–2 oz/gal Sodium orthosilicate ¼ oz/gal Trisodium phosphate	140–180	½–2
STEEL	½–2 oz/gal Caustic soda ½ oz/gal Trisodium phosphate	140–180	½–2
ZINC	½–1 oz/gal Metasilicate ½–1 oz/gal Soda ash	140–170	½–2

Note: These baths are not intended to represent commercial baths since these may contain soaps, surfactants, defoamers, water treating chemicals, etc. Rather, these show the basic chemicals which are used in these operations.

Tables courtesy Pennsylvania Salt Mfg. Co., Philadelphia

TABLE 8 COMPARISONS OF PICKLING, DEGREASING, CLEANING AND DESCALING

FACTORS	Tumbling	Sand and Shot Blasting	Flame Cleaning	Safety Solvent Degreasing	Chlorinated Solvent Degreasing	Emulsifiable Solvent Degreasing	Chemical and Electro-Chemical Cleaning	Immersion and Electro-Pickling	Scratch Brushing	Ultrasonic Cleaning	Catalyzed Salt Cleaning (Kolene)	Sodium Hydride Descaling (Du Pont)	Virgo Salt Descaling (Hooker)
EQUIPMENT	Horizontal or tilting barrel—20 to 60 rpm	Air blasting, etc., or centrifugal wheels	Oxyacetylene multiflame torches	Tanks and/or conveying and spraying equipment	Special vapor-phase degreasing machines	Same as for safety solvents and heat	Revolving barrels may be used (drums)	Tanks, acid lined	Hand brushes or polishing lathes	Ultrasonic generator transducers, tank	Heated tank Water rinses D. C.	Salt bath furnace Acid tubs Ammonia dissociator	Fused salt bath, tanks, conveying equipment
MEDIUM (solutions or materials)	Steel balls, stars, slugs, or chemicals and soaps	Sand or grit or shot	Oxyacetylene multiflame torches	Mineral solvents with flash point over 100° F	Tri-or per chlorethylene or equal	Mineral solvent mixed with suitable detergents etc., followed by a hot water treatment.	Generally alkaline solutions	Various acids.	Hand brush-polishing lathes.	Aqueous solutions of detergents or alkaline cleaners, emulsion cleaners or naphtha	Proprietory Catalyzed Salt Compound	Fused caustic soda containing 1.5-2.0% Sodium Hydride. Acid solutions for after treatments	Fused salt, water quench, acid dip
SIZE AND SHAPE LIMITATION	Maximum 10-lb pieces. No interstices	Generally castings all sizes except smallest—not used after machining	No thin sections: only for large work	All shapes and sizes					Small parts, not for production	Usually small, intricate shapes	All shapes and sizes Iron and steel	All shapes and sizes	
USUAL SUBSEQUENT OPERATION	Plate after pickling Painting		Painting	Painting or pickling or chemical cleaning, polishing, etc.			Plating Painting	Alkaline cleaning	Painting Polishing	Plating	Machining Brazing Tinning, polishing Coating	Further processing Fabrication Finishing	Further fabricating
SURFACE AND METAL EFFECTS	Stress relief may occur. Removes dirt and scale. Dimensional changes		Removes dirt and scale	No change to metal or surface. Removes oils, greases, and removes solid-particle dirt if loosely held.			Removes dirt, vegetable, and animal oils	Removes oxides and scale		Light surface scrubbing action	Removes sand, scale and other oxides. Carbon, graphite, oils, etc.	Removes dirt and scale	Removes oxides, scale dirt, carbon silicon, etc.
OPERATING TEMPERATURES	Room, chemical barrel cleaning at elevated temperatures	Room	Extremely high temperature	Room	188° F usually	Room, followed by hot water at 200° F	Generally 140° to 200° F	Room to 180° F	Room	Generally 90° to 160° F	825° to 975° F	700° to 775° F	800° to 1250° F
HEALTH HAZARDS	Safe	Precautions required	None	Slight	Care required	Slight to none	Slight to considerable	Considerable	Slight	Depends on medium used	Precautions required	Care required	Precautions required
FIRE HAZARDS	Safe	None	As hazardous as welding	Fairly safe	Very slight	Fairly safe	None	None	None	Depends on medium used	Safe with proper precautions	Similar to other molten baths	None
WORKMEN	Semiskilled	Semiskilled	Semiskilled	Unskilled	Semiskilled	Unskilled	Unskilled	Unskilled	Unskilled	Semiskilled	Semiskilled	Semiskilled	Unskilled
MECHANICAL CLEANLINESS (i. e. oxide and scale removed)	Yes	Yes	Yes	No	No	No	No	Yes if not too heavy	Yes	No	Yes	Yes	Yes
PHYSICAL CLEANLINESS (Oil and grease and solid particle dirt removal)	No	Yes	Yes	Yes	Yes	Yes	Yes, except mineral oils	No	No	Yes	Yes	Yes	Yes
CHEMICAL CLEANLINESS (All soils and dirt and chemicals—finger prints)	Mostly	Mostly	No	No	No	No	Yes	No	Mostly	Yes	Yes	Yes	Yes
SUBSEQUENT OXIDATION	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Same as base metal	Carbon steel—yes Stainless steel—no	No

TABLE 9 PROPERTIES AND USES OF CHLORINATED SOLVENTS

TABLE 9 PROPERTIES AND USES OF CHLORINATED SOLVENTS

	CARBON TETRACHLORIDE	ETHYLENE DICHLORIDE	TRICHLOR-ETHYLENE	PERCHLOR-ETHYLENE	PROPYLENE DICHLORIDE	o-DICHLORO-BENZENE	METHYL CHLOROFORM
FORMULA	CCl_4	$ClCH_2.CH_2Cl$	$ClCH:CCl_2$	$Cl_2C:CCl_2$	$CH_3.CHCl.CH_2Cl$	$1,2\text{-}C_6H_4Cl_2$	$CH_3.CCl_3$
MOLECULAR WEIGHT	153.84	98.97	131.40	165.85	112.99	147.01	133.42
BOILING POINT (760 mm.), °C °F	76.75 170.15	83.4 182.1	86.9 188.4	121.2 250.2	96.2 205.2	180.5 356.9	74.1°C (165.4°F)
FREEZING POINT, °C °F	−23.0 −9.4	−35.9 −32.6	−86.4 −123.5	−22.35 −8.2	−100.4 −148.7	−17.0 +1.4	−33.0°C (−27.4°F)
VAPOR PRESSURE (mm. Hg), 20°C	91.1	66.8	57.8	14.4	39.7	1.1	101 mm. Hg at 20°C
SPECIFIC GRAVITY, VAPOR (Air = 1)	5.31	3.48	4.54	5.73	3.90	5.07	4.60
DENSITY, LIQUID (20°/4°C) Pounds/Gallon, 20°C (68°F)	1.594 13.30	1.253 10.45	1.464 12.22	1.623 13.53	1.156 9.65	1.306 10.90	1.327 at 20°/4°C 11.07 (20°C)
SOLUBILITY IN WATER g./100 g. water	0.08 (25°C)	0.84 (25°C)	0.11 (25°C)	0.015 (25°C)	0.27 (20°C)	0.0145 (25°C)	——
SOLUBILITY OF WATER IN SOLVENT g. water/100 g. solvent	0.013 (25°C)	0.16 (20°C)	0.027 (25°C)	0.0105 (25°C)	0.04 (20°C)	——	——
LATENT HEAT OF VAPORIZATION cal./g. (B.P.) B.T.U./lb.	46.8 84.2	77.3 139.1	57.2 103.0	50.0 90.0	67 121	65 117	——
SPECIFIC HEAT, LIQUID, 20°C cal./g./°C or B.T.U./lb./°F	0.205	0.308	0.225	0.205	0.22	0.27	0.275 at 20°C
FLASH POINT (Closed Cup)*, °F	none	56	none	none	60	151	none
MAX. ALLOWABLE CONCENTRATION in Air, parts per million**	25	100	200	200	75	50	500
STABILITY	May be used in the presence or absence of air and light with the common construction metals up to 130°C (266°F). In the presence of undissolved water, carbon tetrachloride hydrolyzes readily, and at its boiling point, wet carbon tetrachloride will corrode most of the common construction metals.	May be used in the presence or absence of air and light with the common construction metals at temperatures up to 100°C (212°F). In contact with water it hydrolyzes slowly at 80°C (176°F).	May be used in the presence of air, water, and light with any of the common construction metals at temperatures up to 120°C (248°F).	May be used in the presence of air, water, and light with any of the common construction metals at temperatures up to 140°C (284°F).	Compares in stability to ethylene dichloride.	Completely stable in the presence of air, water and light under normal atmospheric conditions. Practically nonflammable. Clear, colorless and pungent.	Not subject to oxidation in presence of light. Although there is a tendency to hydrolyze slowly in presence of water at elevated temperatures, hydrolysis at room temperature is negligible. Contact with aluminum should be avoided as this solvent corrodes aluminum excessively. An inhibitor is being sought for the aluminum reaction and may soon be available.
USES	Degreasing and cleaning metals, textiles, leather; fire-extinguishing fluid; fumigant; in organic syntheses; solvent for fats, oils, waxes, rubber, resin, certain gums, resins, etc.	Cleaning metals, textiles, leather; fumigant; paint removers; in organic syntheses; solvent for fats, oils, waxes, some alkaloids, certain resins, and cellulose derivatives.	Vapor degreasing metals ceramics; heat-transfer fluid; F. P.-depressant; solvent for oils, fats, waxes, alkaloids, rubber, resins; in organic syntheses.	Drycleaning fluid; vapor-degreasing and drying metals, etc.; heat-transfer medium; solvent for rubber, waxes, tar, paraffin, gums; in organic syntheses.	In cleaning and spotting mixtures; in organic syntheses; fumigant; insecticide; solvent for oils, fats, waxes, gums, and resins, also some dyes.	Metal cleaners and polishers (dissolves nonferrous oxides); in lacquers and varnishes; preservative, fumigant; in organic synthesis; solvent for oils, waxes, tars, sulfur, resins.	Cold cleaning.

* "NFPA Handbook of Fire Protection," Robt. S. Moulton, National Fire Protection Assoc., 11th Ed. (1954), pp. 295, 302, 314.
** "Threshold Limit Values for 1953," American Conference of Governmental Hygienists, A.M.A. Archives of Industrial Hygiene and Occupational Medicine, Vol. 8, pp. 296–7 (1953).

TABLE 10 INFRARED AND CONVECTION DRYING—TIMES, TEMPERATURES

	LAMP INFRARED INPUT WATTS PER SQ FT*						FORCED CONVECTION AIR TEMP.		
	720		1080		1440		18 ga.		
MINUTES	18 ga.	12 ga.	18 ga.	12 ga.	18 ga.	12 ga.	300°F	390°F	660°F
1	242°F	150°F	320°F	185°F	460°F	226°F	138°F	235°F	310°F
2	360	225	468	286	556	360	186	308	425
3	428	290	532	370	622	470	212	340	496
4	457	342	562	435	654	538	230	360	540
5	474	385	576	480	668	580	243	370	577
6	482	415	580	500	675	608	254	375	600
7	487	435	584	530	678	630	263	378	620
8	489	450	586	540	679	644	270	380	625
9	492	460	587	550	680	655	275	381	628
10	493	464	587	555	680	662	280	382	630

NOTE: Metal temperatures (approximate) are shown for three moderate infrared intensities and three forced convection oven air temperatures at normal velocity.

* Conventional lamp equipment provides input intensities up to effectively 3000 w per sq ft of product. Resistance type equipment is available up to 4500 w per sq ft. New lamp equipment can provide up to 13,500 w per sq ft of product. Theoretically this latter value would approximate the performance of an 1800°F forced convection furnace or kiln.

Tables courtesy The Fostoria Pressed Steel Corp., Fostoria, Ohio

TABLE 11 TYPICAL ORGANIC COATING PROPERTIES

COATING	TYPE	RESISTANCE TO						Flexural Strength	Adhesion	Toughness	Color Retention
		Heat	Sunlight	Marring	Weak Acids	Mineral Solvents	Water				
NITROCELLULOSE LACQUERS	Clear Pigmented	Poor Poor	Fair Good	Good Good	Poor Poor	Fair Fair	Poor Poor	Good Good	Good Good	Good Good	Fair Good
ALKYD	Clear Pigmented	Fair Fair	Good Excellent	Good Good	Fair Fair	Fair Fair	Good Good	Good Good	Good Good	Good Good	Good Excellent
ALKYD-UREA	Clear Pigmented	Good Good	Good Good	Excellent Excellent	Good Good	Good Good	Good Good	Fair Fair	Good Good	Good Good	Good Good
ALKYD MELAMINE	Clear Pigmented	Good Good	Good Good	Excellent Excellent	Good Good	Good Good	Good Good	Fair Fair	Good Good	Good Good	Excellent Excellent
PHENOL FORMALDEHYDE (heat-setting)	Clear Pigmented	Good Good	Fair Fair	Excellent Excellent	Excellent Excellent	Excellent Excellent	Excellent Excellent	Poor Poor	Fair Good	Good Good	Fair Fair
CHLORINATED RUBBER	Clear Pigmented	Fair Fair	Poor Good	Fair Fair	Good Good	Poor Poor	Good Good	Fair Fair	Good Good	Good Good	Poor Good
SHELLAC	Clear	Fair	Poor	Good	Poor	Good	Poor	Poor	Good	Good	Poor
OIL-BASE PAINTS	Pigmented	Fair	Good	Fair	Poor	Fair	Good	Good	Good	Good	Good
MODIFIED EPOXY (heat-setting)	Clear Pigmented	Good Good	Fair Good	Excellent Excellent	Good Good	Excellent Excellent	Good Good	Excellent Excellent	Excellent Excellent	Excellent Excellent	Fair Good
EPOXY-ESTERS	Clear Pigmented	Good Good	Good Good	Good Good	Good Good	Fair Fair	Good Good	Good Good	Good Good	Good Good	Good Good
VINYLS	Clear Pigmented	Fair Fair	Poor Good	Fair Fair	Good Good	Fair Fair	Fair Fair	Excellent Excellent	Fair Fair	Good Good	Poor Good
SILICONE ALKYD	Clear Pigmented	Excellent Excellent	Excellent Excellent	Excellent Excellent	Good Good	Fair Fair	Good Good	Good Good	Good Good	Good Good	Excellent Excellent

Table courtesy The Vorac Co., Rutherford, N. J.

TABLE 12 DEBURRING AND FINISHING WITH NON-METALLIC MEDIUMS

METAL	FORM	MEDIUM SIZE	MEDIUM TYPE†	COMPOUND†	AMOUNT OF COMPOUND*	WATER*	ROLLING TIME	FINISH
STEEL (mild)	Stampings Forgings Screw Mach. Parts	¼ to 1 in. ¼ to 1 in.	Type I Type II	Class A or B	2–3 lb	1–2 gal	1–6 hr	Matte
		¼ to ½ in. ¼ to ½ in.	Type I Type II	Class D	4–8 oz	4–5 gal	½–3 hr	Bright
BRASS BRONZE	Sand Castings	⅓ to 1 in.	Type I	Class A	2–3 lb	1–2 gal	15–25 hr	Matte
					This may be followed with			
		1/6 to ½ in.	Type II	Class D	4–8 oz	4–5 gal	1–3 hr	Bright
BRASS (light burr)	Stampings Screw Mach. Parts	⅛ to ½ in.	Type I	Class D	4–8 oz	4–5 gal	1–2 hr	Bright
ALUMINUM	Castings Forgings Stampings	½ to 1 in. ¼ to ¾ in.	Type II Type I	Class A or B	1–2 lb	2 gal	1–5 hr	Dull to Matte
	Forgings Stampings	½ to 1 in. ¼ to ¾ in.	Type II Type I	Class B	1–2 lb	2 gal	2–6 hr	Dull
		⅛ to ¼ in.	Type I	Class D	4–6 oz	4–5 gal	1–3 hr	Bright
NICKEL SILVER	Stampings Forgings	¼ to ¾ in. ⅛ to ½ in.	Type II Type I	Class B	½–2 lb	1–2 gal	1–4 hr	Dull
					This may be followed with			
		¼ to ¾ in. ⅛ to ¼ in.	Type II Type I	Class D	4–8 oz	4–5 gal	1–2 hr	Bright
ZINC BASE	Castings	¼ to ¾ in.	Type II	Class B	1–2 lb	1–2 gal	1–10 hr	Dull
					This may be followed with			
		⅛ to ½ in.	Type I	Class D	4–5 oz	4–5 gal	1–2 hr	Bright
		⅛ to ½ in. ¼ to ¾ in.	Type I Type II	Class D	4–5 oz	4–5 gal	½–1 hr	Bright
STAINLESS STEEL	Stampings	¼ to 1 in. ⅛ to ¾ in.	Type I Type II	Class A	1–2 lb	1–2 gal	1–8 hr	Dull
					This may be followed with			
		⅛ to ¼ in.	Type I	Class D	4–8 oz	4–5 gal	3–6 hr	Bright

†See legend on next page.

* Weights and volumes are given per cubic foot of mixed work, and medium.

Table courtesy Frederick Gumm Chemical Co., Kearny, N. J.

ROLLING MEDIUM

Basically there are three types of rolling media used in deburring.

TYPE I—Cutting type—Usually this class is based on aluminum oxide, either natural, fused or bonded. This type has heavy cutting ability and does not tend to glaze easily.

TYPE II—Various stones or ceramic media. This type has mild cutting action for a time and then tends to glaze unless used with an abrasive compound.

TYPE III—Metallic slugs. Zinc or soft steel. These have no cutting action per se but always require the use of abrasive compounds.

COMPOUNDS

CLASS A—Heavy cutting abrasive with various detergents, buffers, etc.

CLASS B—Medium cutting abrasive with various detergents, buffers, etc.

CLASS C—Fine cutting abrasive with various detergents, buffers, etc.

CLASS D—Compound containing no abrasive but only detergents, lubricants, buffers, etc.

TABLE 13 DEBURRING WITH METALLIC MEDIUM

METAL	FORM	COMPOUND†	AMOUNT OF COMPOUND§	AMOUNT OF WATER§	ROLLING TIME	FINISH
ALUMINUM	Casting	Class B	1-2 lb	2-3 gal	1-6 hr	Light Matte
	Forging	Class C	½-1 lb	2-3 gal	1-3 hr	Dull to glossy
BRASS	Screw Mach. Stamping Machined Castings	Class B Class C	1-2 lb	2-3 gal	2-5 hr	Light Matte
ZINC BASE	Castings	Class B	1-2 lb	2-4 gal	1-3 hr	Light Matte
			Tumble flush well and follow this with			
		Class D	10-12 oz	3 gal	15 min	Bright
STAINLESS STEEL	Stampings Forgings	Class A	1-2 lb	1-3 gal	3-10 hr	Matte
			Tumble flush and follow this with			
CASE HARDENED STEEL		Class B	1-2 lb	1-3 gal	3-12 hr	Dull
			Tumble flush and follow this with			
		Class C	½-1 lb	1-2 gal	4-10 hr	*High Polish
	Smooth Machined or previously tumbled parts	Class C	1-2 lb	2-4 gal	5-9 hr	Brilliant

† See accompanying legend.
§ Weights and Volumes are given per cubic foot of work plus medium.
* Maximum brilliance is obtained by a final burnish of 15 minutes to 1 hour.

Table courtesy Frederick Gumm Chemical Co., Kearny, N. J.

TABLE 14 RECOMMENDED SIZES OF SHOT AND GRIT

The choice of the proper sized abrasive is a matter of careful appraisal of the type of equipment available, the size and characteristics of the work piece, the type of finish desired, etc. The following table can serve only as a general guide.

DIAMOND GRIT

G-10, G-12 — Cleaning of large grey iron and steel castings—Electric motor frames, cast gears, pressure tanks.

G-14, G-16 — Cleaning of grey iron, malleable iron and steel castings of large and medium size. Preparation of surfaces prior to enameling—both tubs, plumbing fixtures.

G-18, G-25 — Cleaning of medium-sized grey iron, malleable and steel castings and steel forgings and heat treated parts. Preparation of sheet steel for coating. Textile machinery, jobbing foundry work, stove parts, electrical control boxes, reclamation of steel drums, automotive parts, facing of abrasive wheels.

G-40, G-50 — Cleaning of non-ferrous castings. Finishing of grey iron castings, steel forgings or heat treated parts. Hardware, tools, ball bearing races, misc. machine components.

G-80, G-120, G-200 — Cleaning or finishing of delicate work, ferrous or non-ferrous. Rifle parts, needle bearings, drills.

Tables courtesy Harrison Abrasive Div., Metals Disintegrating Co., Elizabeth, N. J.

CHILLED SHOT

SAE 1320 — Back up material for molds using "C" process.

1110 — Burnishing balls in tumbling barrels.

930 — Special weighting material.

780 — Cleaning of large steel castings.

660 — Cleaning of large grey iron castings, steel forgings—motor blocks, axle housings, transmission cases, gate valves, crankshafts, railway equipment.

550 — Cleaning of grey iron and malleable castings—motor blocks, flywheels, manifolds, brake drums, valves. Peening of aircraft propellers.

460 — Cleaning of medium-sized grey iron, malleable iron and steel castings and forgings—valve guides, conveyor parts, agricultural equipment, radiators, textile machines, plumbing fittings.

390 — Cleaning of grey iron and malleable iron castings—lawn mower parts, switch boxes, run-of-the-mill jobbing foundry work, textile machines.

330 — Cleaning of small grey iron and malleable iron castings—tools, pump parts, plumbing fittings, textile machinery, small automotive and machine parts. Peening of aircraft engine parts.

230 — Cleaning of small parts—grey iron, malleable iron, and non-ferrous materials. Peening of flat and coil springs.

170, 110, 70 — Cleaning of thin-section pieces—stampings, knife blades, small tools. Peening and cleaning of turbine blades. Cleaning and finishing of non-ferrous parts.

(See next page for shot and grit sizes)

TABLE 15 CAST SHOT NUMBERS AND SCREENING TOLERANCES

SAE SHOT NO.†	ON SCREEN	PER CENT MAX.	THRU SCREEN	ON SCREEN	PER CENT MAX.	THRU SCREEN	ON SCREEN	PER CENT MIN.	THRU SCREEN	ON SCREEN	PER CENT MAX.	THRU SCREEN	PER CENT MAX.
1320	4	0	—	—	—	4	6	90	6	7	7	7	3
1110	5	0	—	—	—	5	7	90	7	8	7	8	3
930	6	0	—	—	—	6	8	90	8	10	7	10	3
780	7	0	—	—	—	7	10	85	10	12	12	12	3
660	8	0	—	—	—	8	12	85	12	14	12	14	3
550	10	0	—	—	—	10	14	85	14	16	12	16	3
460	10	0	10	12	5	12	16	80	16	18	11	18	4
390	12	0	12	14	5	14	18	80	18	20	11	20	4
330	14	0	14	16	5	16	20	80	20	25	11	25	4
230	18	0	18	20	10	20	30	75	30	35	12	35	3
170	20	0	20	25	10	25	40	75	40	45	12	45	3
110	30	0	30	35	10	35	50	70	50	80	10	80	10
70	40	0	40	45	10	45	80	70	80	120	10	120	10

TABLE 16 CLEANING GRIT NUMBERS AND SCREENING TOLERANCES

SAE GRIT NO.	HIGH LIMIT SCREEN		NOMINAL SCREEN		LOW LIMIT SCREEN	
	GRIT RETAINED, PCT MAX.	SCREEN NO.	GRIT RETAINED, PCT MAX.	SCREEN NO.	GRIT TO PASS, PCT MAX.	SCREEN NO.
G 10	0	7	80	10	10	12
G 12	0	8	80	12	10	14
G 14	0	10	80	14	10	16
G 16	0	12	75	16	15	18
G 18	0	14	75	18	15	25
G 25	0	16	70	25	20	40
G 40	0	18	70	40	20	50
G 50	0	25	65	50	25	80
G 80	0	40	65	80	25	120
G 120	0	50	60	120	30	200
G 200	0	80	55	200	35	325
G 325	0	120	20	325	—	—

SCREEN NUMBERS AND APERTURES (INCHES)

4	0.187	20	0.0331
5	0.157	25	0.0280
6	0.132	30	0.0232
7	0.111	35	0.0197
8	0.0937	40	0.0165
10	0.0787	45	0.0138
12	0.0661	50	0.0117
14	0.0555	80	0.007
16	0.0469	120	0.0049
18	0.0394	200	0.0029
		325	0.0017

* Per cent of total sample by weight retained by "on" screen and passed by "thru" screen. Thus 4 (0.187) denotes screen No. 4 with 0.187-in. aperture. Percentages given are the basis of weight as determined by the test procedure for shot.

† The Society of Automotive Engineers' Recommended Practice provides for standard Shot and Grit size numbers. For Cast Shot, this number corresponds with the aperture size of the nominal screen. For Grit, this number corresponds with the number of the nominal screen with the prefix G added.

TABLE 17 POLISHING WHEEL GRIT SIZES

PARTS	POLISHING OPERATION				
	FIRST	SECOND	THIRD	FOURTH	FIFTH
AXES	46	80	120	180*	.....
ALUMINUM, SAND CAST (Inside-Bottom)	36 or 46	.....	.....	.....	.....
ALUMINUM, SAND CAST (Outside)	60 or 80	150	Buff	.....	.....
ALUMINUM, DIE CAST	150*	Buff	.....	.....	.....
ALUMINUM, SHEET	120*	180*	Buff	.....	.....
AUTO BUMPERS	60–90	120	180*	220*	
AUTO HEADLIGHTS	180 or 220*	Buff	.....	.....	.....
BAND SAW STEEL	60–80	120 or 150	.....	.....	.....
BRASS, SAND CAST	60–80*	150 or 180*	.....	.....	.....
BRASS, SHEET	180 or 220*	Buff	.....	.....	.....
ELECTRIC IRONS	80	120*	150*	180 to 240*	.....
GRAY IRON, PICKLED	80	120 or 150	.....	.....	.....
GRAY IRON, NOT PICKLED	70	120 or 150	.....	.....	.....
HAMMER HEADS	46 or 60	100 or 120*	.....	.....	.....
KNIVES, TABLE AND STEEL BLADES	80 or 90	120 or 150*	180—double header 240— machine	Buff	.....
KNIVES, TABLE, BACKS	46 or 60	.....	.....	.....	.....
KNIVES, MACHETE, EDGES	46 or 60	.....	.....	.....	.....
KNIVES, MACHETE, FACES	80	120*	.....	.....	.....
LOCOMOTIVE SIDE RODS	36	60	120	.....	.....
MONEL METAL, DEEP DRAWN	120	150	180*	Buff	.....
MONEL METAL, CAST	80	120	150	180*	Buff
MONEL METAL, FULL FINISH SHEET	150	180*	220*	Buff	.....
PLOWS	24	80	150	220*	.....
PLOWSHARES	36 or 46	.....	.....	.....	.....
PLOW DISCS	36 or 46	80	.....	.....	.....
SHEARS, TINSMITH	46	80	120	180	.....
SHOVELS, BLADES	36 or 46	120	.....	.....	.....
SHOVELS, STRAPS	36–60	120	.....	.....	.....
STAINLESS STEEL, MIRROR FINISH	60–80	100–120*	150*	220 or 3F*	Buff
STAINLESS STEEL, COMMERCIAL FINISH	80	100*	120*	150*	.....
WRENCHES	36 or 46	80	120*	.....	.....

NOTE: These recommendations are merely a guide and may vary somewhat under varying conditions. Grit sizes above are based on use of glue as a bonding agent. If wheels are set up with cold cement, one grit size finer is generally recommended. The abrasive is aluminum oxide.

* Denotes grease or oil wheel.

Table courtesy Norton Co., Worcester, Mass.

TABLE 18 HOW TO SELECT POWER BRUSHES

For Jobs Requiring Surface Finish Less Than 30 Microinches rms			For Jobs Which Permit or Require Surface Finish Exceeding 30 Microinches rms*		
Brush Flexibility Rating			Brush Flexibility Rating		
Medium	Medium High	High	Low	Medium	High
Brush Surface Finishing Ability			Brush Surface Finishing Ability		
Very Fine	Fine	Medium	Fine	Medium	Coarse
Brush Action Strength			Brush Action Strength		
Medium	Fast	Very Fast	Fast	Medium	Very Fast
Cord and Fabric Brushes	Tampico and Treated Tampico Brushes	Fine Wire Sections Used with Burring Compound	Wire Wheels	Wire Sections	Coiled Knot Sections
MAJOR BRUSH CHARACTERISTICS					
Fast working medium flexible wheels. Used with cut and color buffing compounds for producing low microinch finishes	Flexible, fast working wheels. Used with burring compounds of tacky composition for producing surface finishes of approx. 8 to 10 microinches rms	For efficient use of wire brushes with compound, select brushes having medium or high density and fine wire size (0.008 in. or finer)	Wide face, dense fill. Used where fast cutting and fine finishes are required. Best general purpose wire brush	Narrow face, medium density. Used where medium brush flexibility is essential to follow contoured surfaces	Narrow face, low density. Used where a high degree of brush flexibility is needed and where surface impact action is necessary, especially to remove surface encrustations
MAJOR APPLICATIONS IN ORDER OF GENERAL USAGE					
1. Cut and color buffing 2. Surface blending 3. Light scale removal 4. Producing surface juncture blends 5. Burr removal	1. Burr (small) removal 2. Producing radii 3. Light scale removal 4. Surface blending 5. Cleaning 6. Satin finishing	1. Burr (medium) removal 2. Light scale removal 3. Satin finishing 4. Producing radii	1. Burr (heavy) removal 2. Producing radii 3. Rust and oxide removal 4. Scale removal 5. Cleaning 6. Surface blending	1. Cleaning 2. Medium scale removal 3. Rust and oxide removal 4. Satin finishing 5. Surface blending 6. Burr removal	1. Heavy scale removal 2. Rust and oxide removal 3. Satin finishing 4. Producing radii 5. Burr removal (on very hard metals)
CORRECTIONS SUGGESTED					
Brush works too slowly	Brush works too fast	Action of brush peens burr to adjacent surface	Finer or smoother finish required	Finish too smooth and lustrous	Brushing action not sufficiently uniform
1. Increase surface speed by increasing OD or rpm 2. Decrease trim length and increase fill density 3. Increase filament diam	1. Reduce surface speed by reducing rpm or OD 2. Reduce filament diam 3. Reduce fill density 4. Increase trim length	1. Decrease trim length and increase fill density 2. If wire brush tests indicate metal too ductile (burr is peened rather than removed), change to nonmetallic brush such as a treated Tampico used with burring compound	1. Decrease trim length and increase fill density 2. Decrease wire diam 3. Try treated Tampico or cord brushes with suitable compounds at recommended speeds 4. Use auxiliary buffing compound with brush	1. Increase trim length 2. Reduce brush fill density 3. Reduce surface speed 4. Increase filament diam	1. Increase trim length and decrease fill density 2. Devise hand held or mechanical fixture or machine which will avoid irregular offhand manipulation

* For very ductile metals see Adjustments Column.

Table courtesy The Osborn Mfg. Co.

PLATING PROCESSES

TABLE 19 METALLIC COATINGS, U.S. GOVT AND ASTM SPECIFICATIONS

SPECIFICATION NO.	TITLE	COATING CHARACTER	THICKNESS IN INCHES	FINISH	SALT SPRAY TEST REQUIREMENTS
QQ-C-320	Chromium plating	Electrodeposited			None
Class 1, Type I		Decorative	0.00001″ min	Bright	
Type II		Decorative	0.00001″ min	Satin	
Class 2		Engineering	0.002″ min	Plated to dimension or ground after plating	
QQ-N-290	Nickel plating	Electrodeposited		Bright or Matte	None
Class 1, Type I		Decorative, Cu + Ni	0.002″ min	On steel base	
Type II		Copper + nickel	0.00125″ min	On steel base	
Type III		Copper + nickel	0.00075″ min	On steel base	
Type IV		Copper + nickel	0.0004″ min	On steel base	
Type V		Nickel	0.0005″ min	On copper alloy base	
Type VI		Nickel	0.0003″ min	On copper alloy base	
Type VII		Nickel	0.0001″ min	On copper alloy base	
Type VIII		Copper + nickel	0.00125″ min	On zinc alloy base	
Type IX		Copper + nickel	0.00075″ min	On zinc alloy base	
Type X		Copper + nickel	0.0005″ min	On zinc alloy base	
Class 2		Engineering	0.003″ min	Plated to dimension or machined after plating	
QQ-P-416	Cadmium plating	Electrodeposited			
Type I, Class A			0.0005″ min	None	240 hr min
Class B			0.0003″ min	None	192 hr min
Class C			0.0002″ min	None	96 hr min
Type II, Class A			0.0005″ min	Chromate	336 hr min
Class B			0.0003″ min	Chromate	288 hr min
Class C			0.0002″ min	Chromate	192 hr min
Type III, Class A			0.0005″ min	Phosphate	240 hr min
Class B			0.0003″ min	Phosphate	192 hr min
Class C			0.0002″ min	Phosphate	96 hr min
QQ-S-365	Silver plating	Electrodeposited	0.0005″ min		None
Type I				Matte	
Type II				Semi-bright	
Type III				Bright	
QQ-Z-325	Zinc plating	Electrodeposited			
Type I, Class 1			0.001″ min	None	192 hr min
Class 2			0.0005″ min	None	96 hr min
Class 3			0.0002″ min	None	36 hr min
Type II, Class 1			0.001″ min	Chromate	192 hr min
Class 2			0.0005″ min	Chromate	96 hr min
Class 3			0.0002″ min	Chromate	36 hr min
Type III, Class 1			0.001″ min	Phosphate	192 hr min
Class 2			0.0005″ min	Phosphate	96 hr min
Class 3			0.0002″ min	Phosphate	36 hr min
MIL-M-6874	Metal spraying, process for	Material as specified	0.002-0.060″ depending on material and application	Light abrasion required. Aluminum surfaces to be dichromated	
MIL-T-10727	Tin plating				
Type I		Electrodeposited	As specified	Lustrous	24 hr min
Type II		Hot-dipped	As specified	Lustrous	24 hr min
MIL-Z-17871 A	Zinc coating	Hot-dip galvanizing	0.003–0.0046″	Bright	None
MIL-P-20218	Chromium plating	Electrodeposited		Ground, honed	None
Type I	(porous)	Channel	0.005″ min radial	20–50% porosity	
Type II	(porous)	Pin-point	0.005″ min radial	20–50% porosity	
ASTM A-123-53	Hot galvanized on steel	Zinc; hot galvanized	0.0034″ min	Bright	None required

(cont'd)

METALLIC COATINGS U. S. Government and ASTM Specifications (Continued) — TABLE 19

SPECIFICATION NO.	TITLE	COATING CHARACTER	THICKNESS IN INCHES	FINISH	SALT SPRAY TEST REQUIREMENTS
ASTM B-141-58	Electrodeposited coating, nickel, chromium, on copper and copper alloys	Electrodeposited nickel or chromium		Bright or dull as specified	None required
Type FC		Nickel	0.0005″ min		
Type FC		Chromium (if required)	0.00001″ min		
Type KC		Nickel	0.0003″ min		
Type KC		Chromium (if required)	0.00001″ min		
Type QC		Nickel	0.0001″ min		
Type QC		Chromium (if required)	0.00001″ min		
ASTM B-142-58	Electrodeposited coatings of nickel and chromium on zinc and zinc-base alloys	Electrodeposited nickel or Chromium		Bright or dull as specified	ASTM B-117
Type FZ		Cu plus Ni	0.00120″ min		
		Copper	0.00020″ min		
		Nickel	0.00050″ min		
		Cr if required	0.000010″ min		
Type KZ		Cu plus Ni	0.00075″ min		
		Copper	0.00020″ min		
		Nickel	0.00030″ min		
		Cr if required	0.000010″ min		
Type QZ		Cu plus Ni	0.00050″ min		
		Copper	0.00020″ min		
		Nickel	0.00030″ min		
		Cr if required	0.000010″ min		
ASTM A-153-53	Zinc coating (hot-dip) on iron and steel	Zinc, hot-dipped	From 0.0017 to 0.0034″ min	None specified	None required
ASTM A-164-55	Electrodeposited coating of zinc on steel	Zinc, electrodeposited		None specified	None required
Type GS		Zinc	0.001″ min		
Type LS		Zinc	0.0005″ min		
Type RS		Zinc	0.00015″ min		
ASTM A-165-55	Electrodeposited coatings of cadmium on steel	Cadmium, electro-deposited		Bright or dull as specified	None required
Type NS		Cadmium	0.0005″ min		
Type OS		Cadmium	0.0003″ min		
Type TS		Cadmium	0.00015″ min		
ASTM A-166-58T	Electrodeposited coatings of nickel and chromium on steel	Nickel and chromium, electrodeposited		Bright or dull as specified	ASTM B-117
Type DS		Cu plus Ni	0.0020″ min		
		Final nickel	0.00100″ min		
		Cr if required	0.000010″ min		
Type FS		Cu plus Ni	0.0012″ min		
		Final nickel	0.00060″ min		
		Cr if required	0.000010″ min		
Type KS		Cu plus Ni	0.00075″ min		
		Final nickel	0.00040″ min		
		Cr if required	0.000010″ min		
Type QS		Cu plus Ni	0.00040″ min		
		Final nickel	0.00020″ min		
		Cr if required	0.000010″ min		
ASTM B-200-55T	Electrodeposited coatings of lead on steel	Lead and/or copper		None specified	ASTM B-117
Type ES		Lead	0.0010″ min		
Type MS		Lead	0.00050″ min		
Type PS		Lead	0.00025″ min		
Type EES		Copper	0.000015″ min		
		Lead	0.0010″ min		
Type MMS		Copper	0.000015″ min		
		Lead	0.00050″ min		
Type PPS		Copper	0.000015″ min		
		Lead	0.00025″ min		
ASTM B-253-53	Electroplating on aluminum alloys	Zinc immersion, copper strike; brass, cadmium, copper, chromium, gold; Nickel plating	0.3 mil max 0.3-0.5 mil (1-2 mil when corrosion conditions require)	None specified	None required
		Silver plating			
		Tin plating			
		Zinc plating			
ASTM B-254-53	Electroplating on stainless steel	Nickel, Cadmium Copper, Brass, Gold, Silver, Chromium	None specified	None specified	None required

TABLE 20

SPECIFICATION PLATING

These tables show the estimated time to produce a given deposit thickness of metal at a known current density. Calculations are based on a cathode efficiency of 100 pct. However, because cathode efficiencies vary below 100 pct, these values must be corrected for plating losses.

Assuming that cathode efficiency is 90 pct, the time value should be increased by 10 pct to plate to the thickness shown.

Where two figures are given, the first denotes hours and the second minutes.

CADMIUM

Cd++

Electrochemical equivalent = 0.0005824 grams per coulomb.
Density = 8.65
Weight = 0.00254 × 929.088 × 8.65 = 20.19 gm.
20.19 divided by 0.0005824 = 34,999 sec. = 582 min. = 9.7 hr.

C. D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	58	1-56	2-54	3-52	4-50	5-48	6-46	7-44	8-42	9-40	19-20	29-0
5	12	23	35	46	58	1-10	1-21	1-33	1-44	1-56	3-52	5-48
10	6	12	17	23	29	35	41	46	52	58	1-56	2-54
15	4	8	12	16	20	23	27	31	35	39	1-18	1-57
20	3	6	9	12	15	18	21	23	26	29	38	1-27
25	2	5	7	9	11	14	16	18	21	23	47	1-10
30	2	4	6	8	10	12	14	16	17	19	39	58
35	2	3	5	7	8	10	12	13	15	16	33	42
40	1	3	4	6	7	9	10	12	13	15	29	44
45	1	3	4	5	7	8	9	10	12	13	26	39
50	1	2	3	5	6	7	8	9	10	11	23	34
gm. per sq. ft.	2.02	4.04	6.06	8.08	10.10	12.12	14.14	16.16	18.18	20.19	40.38	60.57
oz. per sq. ft.	0.07	0.14	0.21	0.29	0.36	0.43	0.50	0.57	0.64	0.71	1.42	2.13

CHROMIUM

6+

Electrochemical equivalent = 0.0000898.
Density = 6.92.
Weight = 0.00254 × 929.088 × 6.92 = 16.32 gm.
16.32 divided by 0.0000898 = 181998 sec. = 3033 min. = 50.5 hr

C. D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	5-4	10-8	15-12	20-16	25-20	30-24	35-28	40-32	45-36	50-36	101-12	151-48
5	1-1	2-2	3-2	4-3	5-5	6-6	7-7	8-8	9-9	10-9	20-18	30-27
10	31	1-2	1-33	2-4	2-35	3-6	3-37	4-8	4-39	5-4	10-8	15-12
15	20	40	1-1	1-21	1-42	2-1	2-22	2-42	3-2	3-22	6-44	10-6
20	15	30	45	1-0	1-16	1-31	1-46	2-1	2-16	2-32	5-4	7-36
25	12	24	36	49	1-1	1-13	1-25	1-37	1-49	2-1	4-3	6-4
30	10	20	30	40	51	1-1	1-11	1-21	1-31	1-41	3-22	5-3
50	6	12	18	24	31	37	43	49	55	1	2	3
75	4	8	12	16	20	24	28	32	36	40	1-21	2-1
100	3	6	9	12	15	18	21	24	26	30	1-1	1-31
150	2	4	6	8	10	12	14	16	18	20	40	1-1
175	2	3	5	7	9	10	12	14	15	17	35	52
200	2	3	5	6	8	9	11	12	14	15	30	46
gm. per sq. ft.	1.63	3.26	4.88	6.51	8.15	9.76	11.40	13.01	14.65	16.32	32.64	48.92
oz. per sq. ft.	0.058	0.12	0.17	0.23	0.29	0.35	0.40	0.46	0.52	0.58	1.15	1.73

BRASS

70-30

Zn++ 0.000339 × 30 per cent = 0.0001017
Cu+ 0.0006588 × 70 per cent = 0.0004612
Electrochemical equivalent 0.0005629
Density = 8.5
Weight = 0.00254 × 929.088 × 8.5 = 20.02 gm.

$$\frac{20.02}{0.005629} = 35{,}580 \text{ sec.} = 593 \text{ min.} = 9.88 \text{ hr.}$$

C. D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.0010	0.002	0.003
1	59	1-59	2-58	3-57	4-56	5-55	6-55	7-54	8-54	9-53	19-46	29-39
5	12	24	36	47	59	1-11	1-23	1-35	1-47	1-59	3-57	5-56
10	6	12	18	24	30	36	42	47	53	59	1-59	2-58
15	4	8	12	16	20	24	28	32	36	40	1-20	1-59
20	3	6	9	12	15	18	21	24	27	30	1-0	1-29
25	2	5	7	9	12	14	17	19	21	24	47	1-11
30	2	4	6	8	10	12	14	16	18	20	40	59
35	2	3	5	7	9	10	12	14	15	17	34	51
40	1	3	4	6	7	9	10	12	13	15	30	45
45	1	3	4	5	7	8	9	10	12	13	26	39
50	1	2	4	5	6	7	8	9	11	12	23	35
gm. per sq. ft.	2.00	4.00	6.00	8.00	10.01	12.01	14.01	16.02	18.02	20.02	40.04	60.06
oz. per sq. ft.	0.07	0.14	0.21	0.28	0.35	0.42	0.49	0.57	0.64	0.71	1.42	2.11

NICKEL or COBALT

Ni++
Co++

Electrochemical equivalent (Ni++) = 0.0003054 gm. per coulomb.
(Co++) = 0.0003040 gm. per coulomb.
As there is only 3 per cent difference all calculations are based on Ni.
Density = 8.75.
Weight = .00254 × 929.088 × 8.75 = 20.61
20.61 divided by 0.0003054 = 67,820 sec. = 1132 min. = 18.8 hr.

C. D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	1-53	3-47	5-41	7-34	9-20	11-12	13-4	14-50	16-48	18-52	37-44	56-36
5	22	45	1-7	1-30	1-52	2-15	2-37	2-59	3-21	3-42	7-24	11-6
10	11	26	34	45	57	1-8	1-19	1-30	1-42	1-53	3-46	5-39
15	7	15	23	30	38	45	53	1-0	1-8	1-15	2-31	3-46
20	6	11	17	23	28	34	40	45	51	56	1-53	2-50
25	5	9	14	18	23	27	32	36	41	45	1-31	2-16
30	4	7	11	15	19	23	26	30	34	38	1-15	1-53
35	3	6	10	13	16	19	23	26	29	32	1-5	1-37
40	3	6	8	11	14	17	20	23	25	28	57	1-25
45	3	5	8	10	13	15	18	20	23	25	50	1-15
50	2	5	7	9	11	14	16	18	20	23	45	1-8
gm. per sq. ft.	2.06	4.12	6.18	8.25	10.31	12.38	14.45	16.50	18.55	20.61	41.22	61.83
oz. per sq. ft.	0.071	0.15	0.218	0.29	0.36	0.44	0.51	0.58	0.66	0.73	1.46	2.18

COPPER

Electrochemical equivalent = 0.0003294 gm. per coulomb.
Density = 8.93.

TIN

Electrochemical equivalent = 0.0003083 gm. per coulomb.
Density = 7.3.

COPPER

Cu++

Electrochemical equivalent = 0.0003294 gm. per coulomb.
Density = 8.93.
Weight = 0.00254 × 929.088 × 8.93 = 21.00 gm.
21.00 divided by 0.0003294 = 63,980 sec. = 1068 min. = 17.8 hr.

C. D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	1-47	3-34	5-21	7-8	8-55	10-44	12-30	14-15	16-2	17-48	35-36	53-24
5	21	42	1-4	1-25	1-47	2-8	2-29	2-50	3-12	3-34	7-8	10-42
10	11	21	32	43	53	1-4	1-15	1-26	1-36	1-47	3-34	5-21
15	7	14	21	28	36	43	50	57	1-4	1-11	2-22	3-33
20	5	11	16	21	27	32	37	43	48	53	1-47	2-40
25	4	9	13	17	21	26	30	34	39	43	1-26	2-9
30	4	8	11	14	18	21	25	29	32	36	1-12	1-48
35	3	6	9	12	15	18	21	24	28	31	1-2	1-31
40	3	5	8	11	13	16	19	21	24	27	54	1-21
45	2	5	7	10	12	14	17	19	21	24	48	1-12
50	2	4	6	9	11	13	15	17	19	21	43	1-4
gm. per sq. ft.	2.10	4.20	6.30	8.40	10.50	12.60	14.70	16.80	18.90	21.00	42.00	63.00
oz. per sq. ft.	0.07	0.15	0.22	0.29	0.36	0.44	0.51	0.59	0.66	0.74	1.47	2.20

TIN

Sn++++

Electrochemical equivalent = 0.0003083 gm. per coulomb.
Density = 7.3.
Weight = 0.00254 × 929.088 × 7.3 = 17.20 gm.
17.20 divided by 0.0003083 = 5582 sec. = 928 min. = 15.48 hr.

C. D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	1-33	3-6	4-39	6-12	7-45	9-18	10-51	12-24	13-57	15-28	30-56	46-24
5	19	37	55	1-14	1-33	1-51	2-9	2-28	2-46	3-5	6-11	9-17
10	9	19	28	37	46	56	1-5	1-14	1-24	1-33	3-5	4-38
15	6	12	19	25	31	38	44	50	57	1-3	2-5	3-8
20	5	9	14	19	23	28	32	37	42	46	1-33	2-19
25	4	7	11	15	19	22	26	30	33	37	1-14	1-51
30	3	6	9	12	15	19	22	25	28	31	1-2	1-33
35	3	5	8	11	13	16	19	21	24	26	53	1-20
40	2	5	7	9	12	14	16	19	21	23	46	1-10
45	2	4	6	8	10	12	14	17	19	21	41	1-2
50	2	4	6	7	9	11	13	15	17	19	37	56
gm. per sq. ft.	1.72	3.44	5.16	6.88	8.60	10.32	12.03	13.75	15.49	17.20	34.40	51.60
oz. per sq. ft.	0.06	0.12	0.18	0.24	0.30	0.37	0.43	0.49	0.55	0.61	1.21	1.82

COPPER

Cu+

Electrochemical equivalent = 0.0006588.
Density = 8.93.
Weight = 0.00245 × 929.088 × 8.93 = 21.00 gm.
21.00 divided by 0.0006588 = 31,990 sec. = 534 min. = 8.9 hr.

C. D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	53	1-47	2-41	3-35	4-29	5-22	6-16	7-10	8-4	8-54	17-49	26-42
5	11	21	32	43	54	1-4	1-15	1-26	1-36	1-47	3-34	5-21
10	5	11	16	22	27	32	38	43	49	54	1-48	2-42
15	4	7	11	14	18	21	25	28	32	36	1-12	1-48
20	3	5	8	11	13	16	19	21	24	27	54	1-21
25	2	4	6	9	11	13	15	17	19	21	43	1-3
30	2	4	5	7	9	11	12	14	16	18	36	54
35	2	3	5	6	8	9	11	12	14	15	30	46
40	2	3	4	5	7	8	9	11	12	13	26	40
45	1	2	4	5	6	7	8	9	11	12	23	35
50	1	2	3	4	5	6	7	9	10	11	21	32
gm. per sq. ft.	2.10	4.20	6.30	8.40	10.50	12.60	14.70	16.80	18.90	21.00	42.00	63.00
oz. per sq. ft.	0.07	0.15	0.22	0.29	0.36	0.44	0.51	0.59	0.66	0.74	1.48	2.22

TIN

Sn++

Electrochemical equivalent = 0.0006166 gm. per coulomb.
Density = 7.3.
Weight = 0.00254 × 929.088 × 7.3 = 17.20 gm.
17.20 divided by 0.0006166 = 2791 sec. = 464 min. = 7.74 hr.

C. D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	46	1-33	2-19	3-5	3-51	4-38	5-24	6-10	6-57	7-44	15-28	23-12
5	9	19	28	37	46	56	1-5	1-14	1-24	1-33	3-5	4-38
10	5	9	14	19	23	28	32	37	42	46	1-33	2-18
15	3	6	9	12	15	19	22	25	28	31	1-2	1-33
20	2	5	7	9	12	14	16	19	21	23	46	1-10
25	2	4	6	7	9	11	13	15	17	19	37	56
30	2	3	5	6	8	9	11	12	14	15	31	47
35	1	3	4	5	7	8	9	11	12	13	26	40
40	1	2	3	5	6	7	8	9	10	12	23	35
45	1	2	3	4	5	6	7	8	9	10	20	31
50	1	2	3	4	5	6	7	7	8	9	18	28
gm. per sq. ft.	1.72	3.44	5.16	6.88	8.60	10.32	12.03	13.75	15.49	17.20	34.40	51.60
oz. per sq. ft.	0.061	0.121	0.18	0.24	0.30	0.37	0.43	0.49	0.55	0.61	1.21	1.82

SILVER

Ag+

Electrochemical equivalent = 0.001118 gm. per coulomb.
Density = 10.50.
Weight = 0.00254 × 929.088 × 10.50 = 24.78 gm.
24.78 divided by 0.001118 = 22,920 sec. = 382 min. = 6.2 hr.

C. D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	38	1-16	1-54	2-33	3-11	3-49	4-27	5-5	5-44	6-22	12-44	19-6
5	8	15	23	30	38	46	53	1-1	1-9	1-16	2-35	2-48
10	4	8	11	15	19	23	27	30	34	38	1-16	1-55
15	3	5	8	11	13	15	18	20	23	25	51	1-16
20	2	4	6	8	10	11	13	15	17	19	38	57
25	2	3	5	6	8	9	11	12	14	15	31	46
30	1	3	4	5	6	8	9	10	11	12	25	38
35	1	2	3	4	6	7	8	9	10	11	22	34
40	1	2	3	4	5	6	7	8	9	10	19	29
45	1	2	3	3	4	5	6	7	8	9	17	25
50	1	2	2	3	4	5	5	6	7	8	15	23
gm. per sq. ft.	2.48	4.95	7.42	9.90	12.38	14.82	17.30	19.80	22.22	24.78	49.50	74.20
oz. per sq. ft.	0.09	0.18	0.26	0.35	0.43	0.53	0.61	0.70	0.79	0.87	1.75	2.62

ZINC

Zn++

Electrochemical equivalent = 0.000339 gm. per coulomb.
Density = 7.1.
Weight = 0.00254 × 929.088 × 7.1 = 16.72 gm.
16.72 divided by 0.000339 = 49,200 sec. = 820 min. = 13.6 hr.

C. D.	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.001	0.002	0.003
1	1-22	2-44	4-6	5-28	6-50	8-18	9-34	10-56	12-18	13-40	27-20	41-0
5	16	33	49	1-6	1-22	1-38	1-54	2-12	2-27	2-44	5-28	8-12
10	8	16	24	32	41	49	57	1-5	1-13	1-22	2-44	5-28
15	6	11	16	22	27	33	38	44	49	55	1-50	2-45
20	4	8	12	16	20	25	29	33	37	41	1-22	2-3
25	3	7	10	13	17	20	23	26	29	32	1-5	2-10
30	3	5	8	11	14	16	19	22	24	27	54	1-21
35	2	4	7	9	11	14	16	18	21	23	46	1-9
40	2	4	6	8	10	12	14	16	18	20	41	1-2
45	2	4	5	7	9	11	13	14	16	18	36	55
50	2	3	5	6	8	10	11	13	14	16	33	49
gm. per sq. ft.	1.67	3.34	5.01	6.7	8.35	10.03	11.70	13.38	15.02	16.72	33.44	50.16
oz. per sq. ft.	0.059	0.108	0.177	0.236	0.295	0.354	0.413	0.472	0.531	0.590	1.180	1.770

TABLE 21 NICKEL ELECTROPLATING BATHS

Type and Nominal Composition	oz/gal	pH	Temp F	Normal C.D. (asf)	Typical Mechanical Properties			
					Stress psi x 10^{-3}	Hardness (Vickers)	Elong. pct in 2 in.	Ult. T.S. psi x 10^{-3}
Watts—Low pH								
Nickel Sulfate	44	1.5–4.0	115–140	25–100	20	140–160	30	55
Nickel Chloride	6							
Boric Acid	5							
Watts—High pH								
Nickel Sulfate	32	4.0–6.0	115–150	20–100	20–70	150–205	20–30	65
Nickel Chloride	6							
Boric Acid	4							
Chloride								
Nickel Chloride	40	2	130–150	25–100	40	230–240	20	98.9
Boric Acid	4							
Chloride-Sulfate								
Nickel Sulfate	26.7	1.5	115	100	31	150–240	20	75
Nickel Chloride	23							
Boric Acid	5.3							
Hard Nickel								
Nickel Sulfate	24	5.6–5.9	110–140	25–50	33	380–480	6	157
Ammonium Chloride	3.3							
Boric Acid	4							
Basic Sulfamate								
Nickel Sulfamate	60	3–5	100–140	65–75	6	140–155	14–31	60
Boric Acid	4							
Sulfamate + Cl (−)								
Nickel Sulfamate	40	3.5–4.2	75–160	20–140	13–18	200–250	5	94–108
Nickel Chloride	4							
Boric Acid	4							
Fluoborate								
Ni Fluoborate	40	2.7–3.5*	130	50	15	130	32	56
Boric Acid	4							

* *Colorimetric*

Table courtesy International Nickel Co., N. Y.

Glossary of

Cleaning and Finishing Terms

Abrasive—Any substance used to rub away or wear away a surface. Applied generally to both bonded (wheels, bricks, files) and unbonded types.

Acid—A chemical which gives hydrogen ions in water solution, and which neutralizes bases to form salts.

Active — Property of reacting chemically, i.e., a metallic surface upon which another metal can be electrodeposited.

Addition Agent—Material added to a bath to improve the quality of the deposit or to extend its plating range.

Adhesion—Ability of a coat to adhere to the material to which it is applied.

Adsorption—A change of concentration at an interface. In an emulsion of oil in a soap solution, soap concentrates on the surface of the oil globules (the interface between oil and water).

Agitation—Movement of electrolyte or cathode to increase the deposition rate in electroplating.

Airblast — Treating of material surfaces by subjecting them to a bombardment of hard, granulated abrasive particles projected at high velocity by compressed air.

Air Hole—Hole or defect in casting caused by gas trapped in the metal during solidification.

Airless Blast Cleaning—Application of abrasive to object to be cleaned by a force other than compressed air, usually by centrifugal force.

Alkali — Broadly, a material which dissolved in water will give it an alkaline reaction—that is, a pH greater than 7. Sodium and potassium hydroxides are caustic alkalies.

Alloy—Metallic material formed by mixing two or more chemical elements in significant amounts. Usually applied to metals to which chemical elements have been added to impart specific properties.

Alman Gage—Used to measure intensity of peening.

Alumina — Aluminum oxide, Al_2O_3.

Ampere—A unit of electric current; the amount of current necessary to plate 0.001118 gram of silver per second; the current which one volt will force through a resistance of one ohm.

Ampere Hour—One ampere of current flowing for one hour.

Amphoteric—Having both acidic and basic properties. Zinc and aluminum hydroxides are amphoteric. With acids, they form salts (as chlorides). With alkalies, they form zincates and aluminates.

Anhydrous — Containing no water.

Anion—An ion which is moved toward the anode by the influence of a difference in potential.

Anode—Positive electrode. The electrode at which oxidation occurs.

Anodic Coating (Anodizing)—A coating or film of a metallic compound usually oxide, formed on metals by an electrolytic oxidation treatment.

Anolyte—The electrolyte around the anode which changes in composition or concentration as reactions occur at the anode.

Aqueous—Watery.

Arrestor, Dust — Equipment which separates dust from air.

Atom—The unit particle of an element.

Atomic Weight — Weight of an element on the atomic scale in which oxygen equals 16.00.

Balanced Bath — Electroplating bath where the amount of metal supplied is about equal to the amount removed.

Barrel—In blast cleaning, a type of equipment into which work is placed (usually in batches) for cleaning purposes. The modern barrel is an automatic cleaning machine which tumbles the work continuously.

Base—A substance which produces hydroxyl ions when dissolved in water, and which neutralizes acids to form salts.

Base Box—Unit of tinplate measure. It corresponds to an area equivalent to 112 sheets of tinplate, each 14 x 20 in.; or 31,360 sq in.; or 217.78 sq ft.

Base Metal—The principal metal in an alloy.

Basis Metal—The metal on which an electroplate is deposited.

Bath—The electroplating solution.

Baume Scale—Scale of specific gravities of solutions.

Blast Carving—Application of abrasive force to metals, stone, wood, glass, etc., to carve a preconceived design on a surface.

Blast Cleaning — Removal of sand, scale, etc., from castings and heat-treated metals by the scouring action of abrasive projected by air, water or centrifugal force.

Bright Dip—An acid solution into which articles are dipped to ob-

tain a clean, bright surface.

Brightener—An additive to an electroplating bath to give the deposit a highly reflective surface.

Brinell Hardness—Testing scale to determine relative hardness of a metal or alloy by measuring the diameter of an impression made by a ball of given diameter under a known load.

British Thermal Unit (B.T.U.)—Amount of heat required to raise 1 lb of water 1°F.

Bronzing—Artificial reproduction of a natural bronze finish.

Buff—A polishing wheel usually consisting of a large number of treated or untreated muslin disks sewed together.

Buffer—A solution which resists and compensates for any change of its degree of acidity or alkalinity.

Burnt Deposit—A dark, powdery electrodeposit usually caused by too fast a rate of deposition.

Cabinet—Blast cleaning machine, usually of the type where work is placed in an enclosure and cleaned by an operator who stands outside and manipulates the work or the abrasive stream through armholes in a machine to secure results.

Capillary—A tube of very small bore; any similar pore, crack or fissure of microscopic dimensions.

Casting Washer—Equipment designed to clean large castings by means of coarse sand suspended in water under high pressure.

Cathode — The negative electrode; the electrode at which reduction occurs.

Cathode Efficiency—The percentage of current required to produce the required plate at the cathode.

Catolyte—The electrolyte around the cathode which changes in composition or concentration as reactions occur at the cathode.

Caustic Dip—Immersion in a solution of sodium hydroxide to clean the surface or, when working with aluminum alloys, to reveal the macrostructure.

Caustic Embrittlement — Metal embrittlement caused by contact with an alkaline solution.

Centigrade — Temperature scale on which the freezing point of water is 0° and the boiling point is 100°.

Checking—Slight breaks in a coating which do not penetrate to the underlying metal.

Chips—Common term for stone-like media, natural or manufactured, of various sizes and shapes for tumbling-barrel finishing.

Colloid—A phase subdivided and dispersed to such a degree that its surface forces become an important factor in determining its properties.

Concentration—The amount of substance (in weight, or in percent) contained in a unit volume of solution.

Conductance—The reciprocal of resistance; ability to allow electric current to pass.

Conductivity—Ability of an electrolyte to conduct current.

Contaminants—Impurities in a plating, cleaning or pickling solution.

Conversion Coating—A protective or decorative insoluble film which forms as a result of the reaction between a metal surface and a solution.

Coolant—A fluid vehicle for conveying heat away.

Coulomb—One ampere of current flowing for one second.

Counter-Current—Term applied when two streams of current move in opposite directions to each other.

Cracking—Breaks in a coating which penetrate to the underlying metal.

Crazing—A network of surface cracks or checks.

Crystallization — Formation of crystals by the atoms assuming definite positions in a crystal lattice.

Current Density—Amount of current per unit of area; usually expressed in amperes per square foot (asf).

Cutwire Shot—Abrasive material made by cutting hard drawn steel wire into small pieces.

Decomposition Potential — The minimum potential required to start a reaction at an electrode.

Decorative Carving—Use of an abrasive force to carve a design on a surface of metal, wood, glass, etc.

Deflocculate—To break up and put in fine dispersion; to put in a colloidal condition.

Descaling—Scale removed from a metal surface by the use of salt, hydrostatic pressure, high-temperature flame or other means.

DichromateTreatment—A chemical treatment for magnesium alloys in a boiling solution of sodium dichromate, resulting in a surface film that resists corrosion.

Dispersion—A very fine suspension, or a colloidal solution.

Drag-In — Impurities introduced into a solution from prior treatments given to workpieces.

Drag-Out—Solution lost from a bath by the workpieces carried through it.

Dummying—Refers to the removal of metallic contaminants from plating solutions by electrolyzing the solutions at low current density.

Electrochemical Equivalent—Reduction in weight of an element or elements at an electrode in an electrolytic cell by passing current through it; usually expressed in grams per coulomb.

Electrochemical Series—Tabulation of metals and alloys in which each metal or alloy is electropositive to all placed after it and electronegative to all before it; galvanic series.

Electroforming—Making or reproducing of parts by electroplating.

Electrogalvanizing — Deposition of zinc by electrolytic action (as opposed to hot-dip galvanizing).

Electroless Plating—Plating by chemical reduction.

Electrolysis—The electrochemical reactions resulting from the passage of direct current through an electrolyte.

Electrolyte—A solution of a salt, acid or base which conducts current.

Electrolytic Cleaning—Cleaning by, or aided by, electrolysis.

Electrolytic Pickling — Electrochemical removal of surface oxides.

Electromotive Force — Electric potential; voltage (emf).

Electropolishing—Dissolution of a metal surface to a smooth finish by electrolytic means.

Electropositive — That which passes to the cathode during electrolysis; opposite of electronegative.

Emery—A natural abrasive of the aluminum-oxide type.

Emulsion—A dispersion of minute drops of one liquid in another.

Etch—To chemically remove part of the surface of a metal, producing roughness.

Exfoliation—Sealing of a surface by flakes or layers.

Fahrenheit — Temperature scale in which 32° denotes the freezing point and 212° denotes the boiling point of water.

Faraday—The amount of electricity necessary to plate out one atomic weight of a monovalent metal (as $Ag+$), one half atomic weight of a divalent metal (as $Cu++$), etc. 1 F = 96,500 coulombs.

Fines—Sand grain sizes substantially smaller than the usual grain size of molding sand, usually present in spent abrasive after blast cleaning because of disintegration of sand grains under abrasive force.

Fogging—Loss of luster or reflectivity caused by a film of corrosion products on a metal surface.

Galvanic Series—List of metals and alloys in the order of their tendency to go into solution, and serves as a guide to their corrosion resistance; electrochemical series.

Gas Plating—Plating in an enclosed and controlled atmosphere by means of heat-decomposable metal vapor compounds.

Grit, Abrasive—An abrasive material consisting of crushed ferrous or synthetic material which presents a series of fine cutting surfaces against the work to be cleaned.

Hydrogen Embrittlement—Severe loss of ductility caused when hydrogen enters a metal or alloy.

Hydrolysis — Chemical reaction between water and a salt dissolved in it, whereby the latter partially reverts to the acid and base from which the salt was formed.

Hydroxide — A hydrated metal oxide; a base; a compound which will give hydroxyl ions (OH-) in solution.

Immersion Plating—Plating by chemical reduction of a metal from a solution of its salts rather than by electrolytic means.

Inhibitor—Material which will prevent or retard a chemical reaction; material whose presence prevents or retards corrosion of a metal.

Insoluble Anode—In electrodeposition, an anode that does not go into solution during the electrolytic process.

Interfacial Tension—The physical force which keeps oil and water from mixing, and which determines the boundary between two liquids when brought together.

Ion — An electrically charged atom or group of atoms. Ions having a positive charge have fewer electrons than are necessary for the atom or group of atoms to be neutral electrically; negative ions have more electrons.

Matte Finish—A surface finish having low specular reflectivity.

Metal Replacement—Deposition of a metal from a solution of its ions on a more anodic metal, accompanied by solution of the latter metal.

Metallizing—Spraying a surface with metal.

Mineral Acids—Inorganic acids, commercial quality, as muriatic or sulphuric.

Neutralization—An intermediate dipping of workpieces between a change from an acid tank to an alkali tank, or vice versa, to prevent excessive contamination of a solution.

Noble Metal—One which does not react readily with water, air, acids or other environmental media; a metal which is low in the electrochemical series.

Ohm—Unit of electrical resistance.

Overvoltage—For the same reaction, the difference between the potential at an electrode at which a reaction is actively taking place and another electrode at equilibrium. In plating, the minimum voltage at which reaction at the electrode begins.

Oxidation—Loss of electrons by a constituent of a chemical reaction.

Passive—That property of a surface which inhibits chemical reaction. Electroplating is impractical on passive surfaces.

Patina—A greenish coating consisting mostly of sulphate which forms on copper and its alloys by long-time exposure to the atmosphere.

Peeling — Unintended separation of an electrodeposit from the metal which it coats.

Periodic Reverse Plating—Reversal of current polarity during the plating cycle to achieve smoother

deposits, less nodular growth and to permit use of higher current density.

pH—Symbol which indicates the degree of acidity or alkalinity. On the pH scale, acidity decreases from 0 to 7. The neutral point is at pH 7. From pH 7, alkalinity increases up to a maximum of pH 14.

Phase—One of the constituents of a non-homogeneous system. In an emulsion of oil in water, there are two phases. The water (or aqueous phase) is the continuous phase whereas oil is the discontinuous phase.

Pickling—Removal of oxides and other inorganic materials from metal surfaces by dipping in an acid solution.

Pitting—A condition in which macroscopic holes appear in an electrodeposit, passing entirely or partially through the coating.

Plating Range—The range of electric current over which a satisfactory plate can be deposited.

Polarization—A reverse potential in electroplating tending to resist the flow of current.

Profilometer — An instrument which measures surface roughness in microinches.

Recoalescence — The union of emulsion globules resulting in a "breaking" or separating of the emulsion.

Reduction—The opposite of oxidation.

Rockwell Hardness—Measure of material hardness by indenting it with a machine using a diamond point.

Rust—Corrosion product of iron, essentially hydrous ferric oxide.

Salt—A chemical compound resulting from the neutralization of an acid with a base. "Acid salts" are incompletely neutralized acids. "Basic salts" are incompletely neutralized bases.

Salt Spray Test — An accelerated corrosion test in which metal specimens are exposed to a fine mist of salt water solution either continuously or intermittently.

Sand Blast — Method of projecting abrasive sand against a material surface to clean, cut, polish or carve it. The term is loosely applied to the blast cleaning process even in cases where metallic abrasives are used.

Scleroscope — Test for relative hardness of a material determined by the drop and rebound of a steel ball.

Scouring—Cleaning of metals mechanically, usually using an abrasive and liquid.

Selective Plating—Electroplating on a selected part of a workpiece by having the remainder stopped off.

Separator, Abrasive — A device used in modern blast cleaning equipment to clean the spent abrasive of blasting debris and return the good abrasive to the system for re-use.

Shot — Type of metal abrasive consisting of small spherical pellets. Cleans without the scouring effect of grit.

Silica—Silicon dioxide, SiO_2.

Silicon Carbide — An abrasive electric furnace product made from coke and sand; SiC.

Soft Abrasive—Type of abrasive used in blast cleaning to clear and wipe away unwanted deposits, such as caked grease, without otherwise affecting the surface. Ground walnut shells, peanut hulls and corn cobs are examples of soft abrasives.

Solubility—The amount of solute (the substance dissolved) present in a given volume of solvent or of solution.

Spotting Out — Appearance of spots on an electroplated or otherwise finished surface caused by the cleaning, pickling or plating solution exuding from its pores.

Stopping Off—Covering part of a surface with a non-conductive material to prevent electrodeposition in that area.

Strike—A low cathode efficiency bath used to improve the bond of the subsequent plate.

Stripping—Removal of defective or otherwise undesirable plated surfaces either chemically or electrochemically.

Surface Tension — The contractive force of a surface measured along a unit of its edge.

Tarnish—To lessen the luster of, by stain or oxidation.

Throwing Power — Ability of a solution to electroplate uniformly on an irregularly shaped cathode.

Titer — The solidification point (degrees temperature) of fatty acids.

Trees — Blanched projections which form on a cathode by electrodeposition.

Turbid—Opaque with finely divided suspended matter.

Valance—The combining power of an element or radical as shown by the atomic weight of the element (or molecular weight of the radical).

Vapor Degreasing—Removal of oil or grease by solvent vapors.

Volt—The electro-potential necessary to force a current of one ampere through a resistance of one ohm.

Watt—A unit of power. 1 volt x 1 ampere = 1 watt. 1 kilowatt (kw) = 1000 watts. 1 kilowatt hour (kwhr) = 1 kilowatt exerted for 1 hour.

Wetting Agent—A material which will give a solution the property of low surface tension and the ability to spread and intimately wet a surface which is in contact with it.

Whitening—Formation of a thin film of white or slivery metal such as tin, nickel or silver on another metal by means of immersion.

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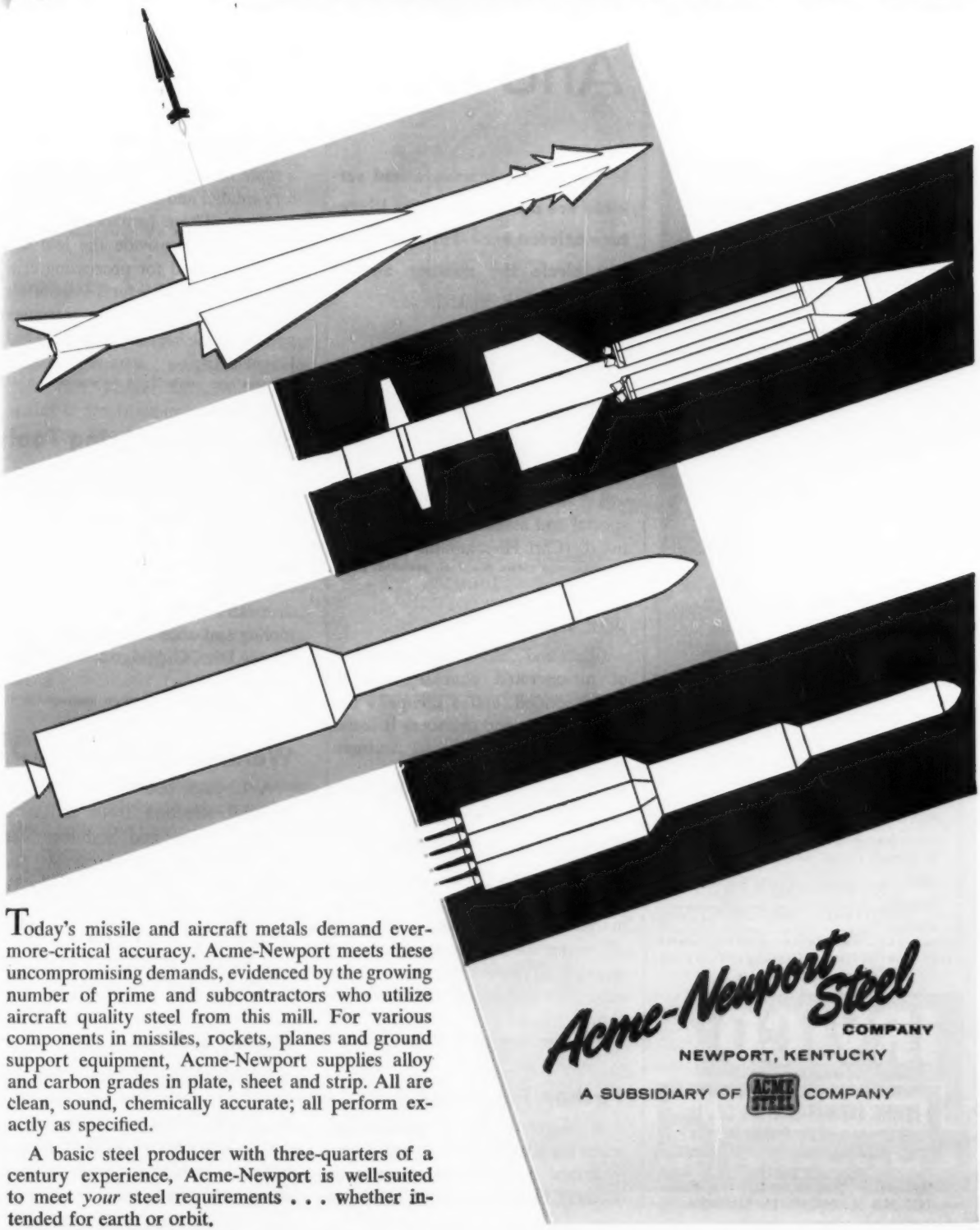

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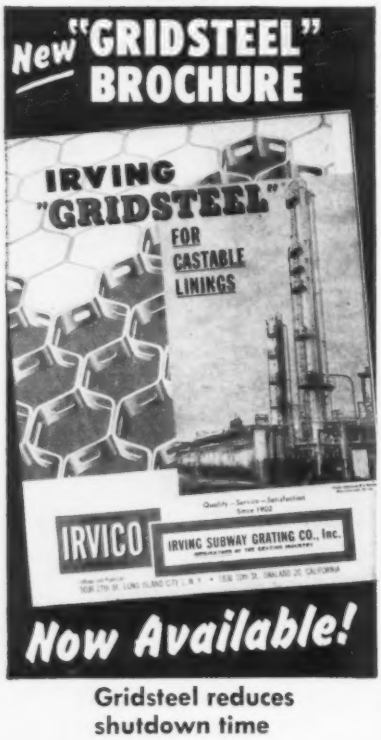

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FREE TECHNICAL LITERATURE

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, p. 153.

Jig-Grinding Machine

A 23-page catalog fully describes the Hauser 3SM precision jig-grinding machine, used for grinding jigs, dies, gages, fixtures, special devices, and machine parts. Over 120 special and standard accessories are listed. (Carl Hirschmann Co., Inc.)

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Air Chucks

Cost- and time-saving advantages of air-operated chucking systems are described, and a complete line of air chucks and cylinders is listed, with mention of special features. (The Cushman Chuck Co.)

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Tables and Formulas

"Convenient Tables and Formulas" is a new 120-page booklet summarizing electrical data, properties of materials, heat transfer and steam, measurements, and other subjects. (Westinghouse Electric Corp.)

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Pusher Furnaces

A complete line of pusher furnaces for temperatures to 2600°F is described in a bulletin. Thirty-four different furnace types are shown in a table listing open-chamber, refractory-muffle, and metallic-muffle type furnaces. These furnaces are noted for ability to provide the low dew points required for processing critical work. Temperature controls, power regulators, and instrument panels available are listed. (C. I. Haynes, Inc.)

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Block-Type Boring Tools

Price reductions as high as 35 pct are reflected in a new catalog of block-type boring tools. Six interchangeable types of blocks, including the new throwaway-carbide-insert type, are described, for boring diameters from ¾ to 17 in. Other tooling and accessories are included. (Davis Div., Giddings & Lewis Machine Tool Co.)

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Welding Fittings

A 12-page booklet is a guide to material selection from a line of carbon, alloy, and stainless steel welding fittings and flanges. All pertinent data are included. Some information on welding procedures is contained. (Tubular Products Div., The Babcock & Wilcox Co.)

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Metal Lathes

Complete line of engine and turret lathes is described and illustrated in a new 20-page catalog. A recently introduced 10-inch lathe is featured, including a variable-speed drive and ¾-in. collet capacity

unique in this size lathe. Turrets and other accessories to convert engine lathes for production work are included. (Delta Power Tool Div., Rockwell Mfg. Co.)

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Rotary Pumps

Six brochures provide user information on a complete line of internal-gear rotary pumps. Performance characteristics and typical uses for each are specified. A pamphlet on hand pumps using the push-pull diaphragm principle is also available. (The Wayne Pump Co.)

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Granite Surface Plates

A complete line of black-granite surface plates, angle plates, straight edges, parallels, magnetic chuck platforms, master flats, and accessories is described and specified in a 12-page brochure. (The DoALL Co.)

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Servo Motors

All basic models of a complete line of precision-made servo motors, sizes 8 to 29, are listed and fully described in a 20-page catalog. (John Oster Mfg. Co., Avionics Div.)

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Carbon-Steel Balls

A brochure illustrates a wide range of products in which carbon-steel balls are used. Discussed are the accuracy and uniformity of the author company's line, ranging from ⅛- to ¾-in. diam. The evolution of a steel ball is illustrated. (Sterling Commercial Steel Ball Corp.)

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Metalworking Facility

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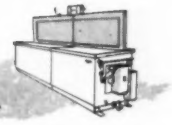

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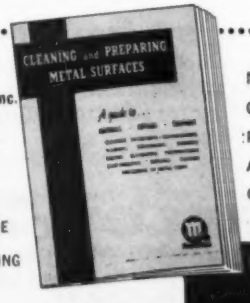

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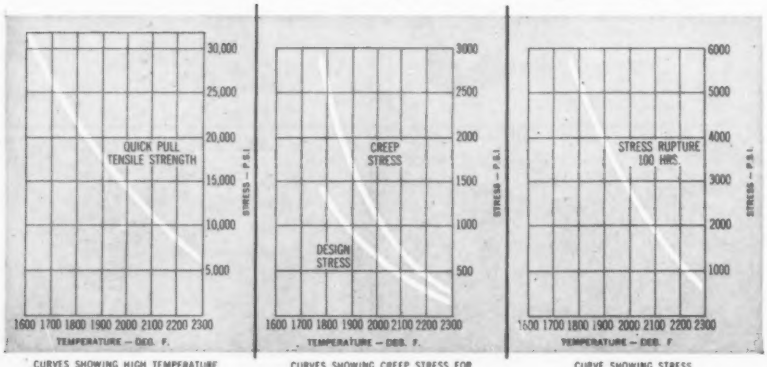

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FREE LITERATURE

and processes has reduced costs and cut time. (Parish Pressed Steel Div., Dana Corp.)
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Shaving Press

The Essa shaving press is illustrated and described in an 11-page brochure. It attains very clean surfaces on previously punched, turned, or forged work pieces by means of vibrations. It is available in five sizes. (Carl Hirschmann Co., Inc.)
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Welded Steel Tubing

A new 12-page brochure covers welded carbon and stainless steel tubing in terms of their composition, advantages, applications, production, and ease of fabrication. (The Formed Steel Tube Institute)
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Gear and Fluid Drives

A line of standardized gear motors, motor gears, and fluid drive is described and specified in a 48-page book. Accessories are included. (Link-Belt Co.)
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Iron-Clad Concrete

Advantages of concrete floors with a surface of metallic aggregate about ⅛-in. thick are described in a bulletin. These advantages include great wear- and corrosion-resistance, slipproofness, color styles, static dissemination, and spark-resistance. (The Master Builders Co.)
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Plastics Checklist

A fourteen-question checklist is available to assist manufacturers who want to investigate the use of custom-molded plastic parts and components. Information required when ordering plastics engineering of manufacturing operations is included. (Plastics Div., Monsanto Chemical Co.)
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FREE LITERATURE

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Fork Trucks

Engineering data, specifications, and operating information on more than 25 fork truck models are presented in a catalog. Major attachments are also covered. (The Elwell-Parker Electric Co.)

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Pipe Data

For engineers, buyers, and others involved in purchasing pipe, a technical data card contains dimensions and weights per foot of pipe in sizes ⅛ through 36 in. for all schedules. (Tubular Products Div., The Babcock & Wilcox Co.)

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Investment Castings

A brochure presents seven case histories to show how investment castings give product improvement with cost reduction. For parts shown, machining, diecasting, welding, stamping, and assembly were variously eliminated. (Engineered Precision Casting Co.)

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Bronze Wear Plates

A full line of wear plates is described in data sheets and bulletins. These plates use a full ¼-inch of aluminum bronze for long life. Fourteen standard cross-sections are available. (The Ohio Knife Co.)

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Welding-Wire Guide

A new six-page folder is available on submerged-arc and inert-gas welding wires. The uses of 26 different stainless, low-alloy, and mild-carbon steel automatic welding wires are described. (Page Steel and Wire Div., American Chain & Cable Co., Inc.)

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Hose Fittings

Complete details and illustrations of a line of air, spray, and welding hose fittings for rubber hose applications are contained in a recent bulletin. (Hose Accessories Co.)

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Cutting Oils

Ten types of cutting oils for metal-cutting needs; including mineral - lard, sulfurized - mineral, sulphurized-mineral-lard, sulphochlorinated-lard, and emulsifying oils; are described in an informative pamphlet. A new heavy-duty soluble oil is described in detail. (Gulf Oil Corp.)

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Apprenticeship Manual

Sample job training and experience for apprentices to 19 metalworking trades are included in a new publication from the U. S. Department of Labor's Bureau of Apprenticeship and Training. (Bureau of Apprenticeship and Training, U. S. Department of Labor)

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Foundry Supplies

A complete line of foundry supplies, facings, compounds, tools, and equipment is presented in a bound 323-page book. All items are described and specified in detail, and much instructional material is included. (The Federal Foundry Supply Co.)

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FIRST CLASS PERMIT No. 36 NEW YORK, N. Y.

BUSINESS REPLY CARD

No postage necessary if mailed in the United States

POSTAGE WILL BE PAID BY

THE IRON AGE

Post Office Box 77, Village Station

NEW YORK 14, N. Y.

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Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. **6/4/59**

Circle numbers for Free Technical Literature, Design Digest, or New Equipment:

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
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FREE LITERATURE

ment of product quality, have been obtained in each of these instances through resistance welding and techniques. (Sciaky Bros., Inc.)

For free copy circle No. 30 on postcard

Punch-Card Economy

A brochure describes how the "Synchro-Tape Typewriter" cuts punched-card costs by using coded tape to eliminate the manual jobs of card punching and verifying. This machine controls and operates machines for writing documents, and also produces punched cards by automatic punching. Data thus taped can be wire-transmitted by normal means at maximum speed. (Remington Rand Div. of Sperry-Rand Corp.)

For free copy circle No. 31 on postcard

Treating Products

Metal-treating additives, compounds, cleaners, salts, and finishes, as well as several cutting oils, are covered in a handy product-finding guide. (John Swift Chemical Co., Inc.)

For free copy circle No. 32 on postcard

Measuring Instruments

A bulletin describes and specifies new gages and instruments, including two comparators, depth gages, weighted indicators, and a magnetic-base indicator support. (Petz-Emery, Inc.)

For free copy circle No. 33 on postcard

Chain Sample Book

A 28-page chain data bulletin provides 146 actual-size illustrations of chain to show most sizes of 17 types of welded and weldless chain. Recommended uses and full data are included. (S. G. Taylor Chain Co.)

For free copy circle No. 34 on postcard

Polish-Grind Wheels

A line of polish-grind wheels, formed of a series of coated abrasive flaps sealed to a hub to form a resilient, smoothing abrasive surface, is described in a product bulletin. Similar wheels using a combination of brushes and abrasive strips for contour sanding are described in an accompanying circular. (Merit Products, Inc.)

For free copy circle No. 35 on postcard

Formed Tubing

Advantages of compression-forming seamless tubing by rocking over a tapered mandrel are discussed, and the various tapers, step tapers, and configured bores, as well as precision straight tubing offered by the author company, are described in a four-page brochure. (Tube Reducing Corp.)

For free copy circle No. 36 on postcard

Monel Tubing Data

"The Monel Family of Small Tubing" is described in a four-page technical bulletin of that title. Chemical, physical, and mechanical properties of four materials in tubing form are listed, as well as their typical uses. Minimum and maximum production size limits on tubing walls for various OD's are included. (Superior Tube Co.)

For free copy circle No. 37 on postcard

No-Corrosion Bricking

A four-page bulletin contains money-saving information on brick floor installation featuring the preparation of corrosion- and wear-resistant joints. Repair of existing floors using special, non-shrink grout is discussed. (The Master Builders Co.)

For free copy circle No. 38 on postcard

Patternshop Supplies

A catalog contains over 100 illustrated pages covering grinders, wax specialties, fillets, pattern plates, and other patternshop, foundry, and industrial equipment and supplies. Patternmaking machinery and types and grades of pattern lumber are extensively discussed. (The Kindt-Collins Co.)

For free copy circle No. 39 on postcard

Torrington Needle Bearings are available for shafts up to 7¼" in diameter. Full complement of rollers provides highest radial capacity for a given cross section. They offer low unit cost, compactness and light weight and long service life. They take a press fit in a simple straight-bore housing, run directly on hardened shafts, permitting use of larger and stiffer shafts.

Why not put a Torrington Needle Bearing on that large shaft?

You have everything to gain by applying a large diameter Torrington Needle Bearing in your heavy duty applications.

There's the unusual economy in price and installation cost over other anti-friction bearings of comparable size. Simplicity of design of related components saves even more. Unequaled capacity for a given cross section, good lubrication and efficient anti-friction operation mean long service life.

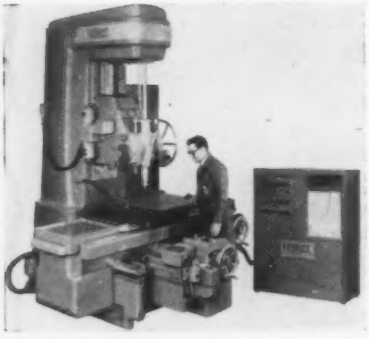
These advantages have been proved in performance in tractor bolsters, transmissions and final drives. In haybaler crank shafts. In power shovels. In heavy duty hydraulic pumps and starting motors. In road wheel arms on tanks. Why not talk over *your* application with your Torrington representative? **The Torrington Company, Torrington, Conn.—and South Bend 21, Ind.**

TORRINGTON BEARINGS

District Offices and Distributors in Principal Cities of United States and Canada

NEEDLE • SPHERICAL ROLLER • TAPERED ROLLER • CYLINDRICAL ROLLER • BALL • NEEDLE ROLLERS • THRUST

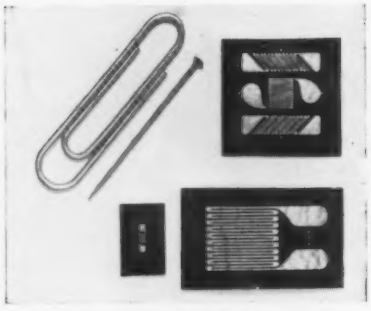
New Materials and Components



Memory System Improves Precision Control

A simple, dependable electromechanical memory system has been developed for numerical control of a line of precision boring machines, which need a memory because of the time lag from tape reading to machine-performance of the action called for. High dependability was found in the cross-bar switch used in automatic telephone systems. This features a grating of crossed bars, actuated by electromagnets. Digital information can be stored in 100 "pockets" of the switch. Five such switches are sufficient to handle all functions of jig-bore automatic control. (Fosdick Machine Tool Co.)

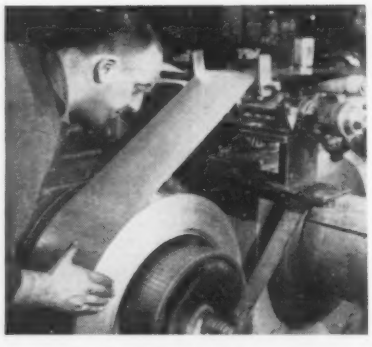
For more data circle No. 40 on postcard, p. 153



Three New Foil Strain Gages Have Many Uses

Three new tiny, high-accuracy foil strain gages have many different uses, some of the latest being on high-speed aircraft, missiles, and jet engines. There are three types: a rosette gage to determine magnitudes and directions of principal strains, a miniature gage for use in areas of very steep strain gradient, and a high-fatigue-life gage for structures undergoing severe dynamic strains. The first two are temperature-compensated for four alloys: steels, 18-8 stainless, magnesium alloys, and aluminum. (Tatnall Measuring Systems Co.)

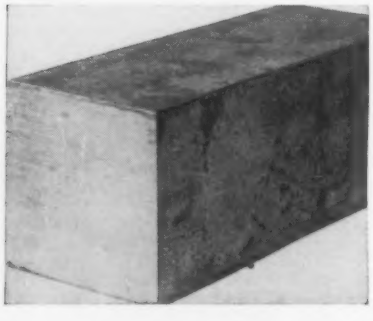
For more data circle No. 41 on postcard, p. 153



Accurately Controls Winding of Strip Metal

A strip winding compensator accurately controls winding of wire strip. This compact unit eliminates expensive air-pressure guides or other types of winding guide controls. It works well with all metals, and processes strips from 3 to 26 in. wide and down to 0.010 in. or less thick without damage to edges or surfaces, at normal speeds. An oscillating guide prevents damage to strip edges during the winding. Power comes from a 1-hp motor. The compensator is furnished with rubber rolls, hardened adjustable guide bars, a hardened and ground driveshaft in bronze bushings, and a drive sleeve. (B. S. Roy & Son Co.)

For more data circle No. 42 on postcard, p. 153



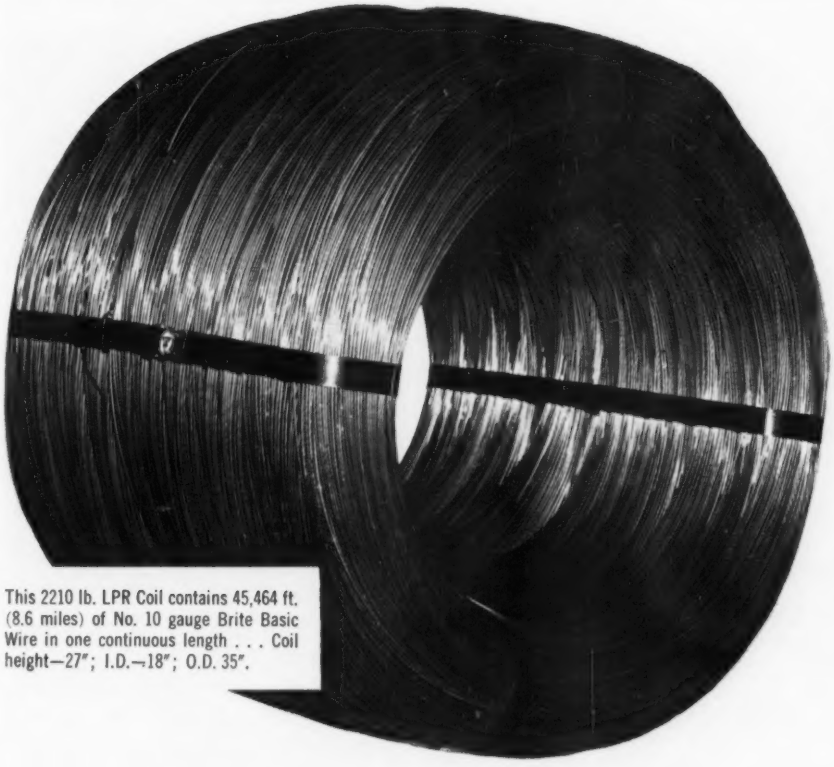
Low-Cost Tool Steel Comes in New Sizes

Available in new sizes is an air-hardening steel which substitutes well for higher-cost, high-carbon, high-chromium steels. It is useful where easy machinability, nondeforming, and simple heat-treatment are important, such as stamping dies, gages, and punches; and also for cutting tools such as reamers, taps, and broaches. It hardens throughout. It is now available in bar stock sizes of rounds from ¼ to 12⅛ in., flats ¼ x 1 to 5 x 6 in., squares ⅜ to 6 in., and square billets 4 to 12 in. (Darwin & Milner, Inc.)

For more data circle No. 43 on postcard, p. 153

DSC-PORTSMOUTH LPR COILS

Help you reduce your manufacturing and handling cost



This 2210 lb. LPR Coil contains 45,464 ft. (8.6 miles) of No. 10 gauge Brite Basic Wire in one continuous length . . . Coil height—27″; I.D.—18″; O.D. 35″.

WHAT USERS ARE REPORTING

LPR's cost no more than conventional size coils but are proving far more efficient and more economical in Brite Wire fabrication. Reason—they permit longer, non-stop, cutting and forming production runs. For example:

. . . "eliminate from 50% to 90% of downtime due to coil changes and set-up adjustments" . . . "cut coil remnant scrap losses to the bone" . . . "saving 15% to 20% in man-hour costs" . . . "reducing handling time from 16% to 50%" . . . "conserving 15% and more storage space" . . . "increasing machine utilization by 33⅓% with no extra costs or capital outlay" . . .

. . . "we got rid of the 'returnables' problem" . . . "discarded small coil racks" . . . "improved our inventory management" . . . etc., etc.

HOW TO GET MORE EFFICIENCY OUT OF YOUR EXISTING WIREWORKING EQUIPMENT?

Before you consider capital outlays for replacement or updating of existing wireworking equipment, see what LPR's can do to improve your efficiency and reduce your manufacturing and material handling costs.

At no extra cost to you, we'll gladly arrange to furnish sample lots for conclusive trials and give you the benefit of our own wireworking experience.

Call in your nearest DSC Customer "Rep" for complete information and helpful suggestions. Do so . . . today?

WEIGHT RANGES OF LPR

CONTINUOUS LENGTH BRIGHT WIRE COILS

LOW AND MEDIUM CARBON	HIGH CARBON
.072″/.500″ inc. (to about 4200 lbs.)	.072″/.250″ inc. (up to about 4200 lbs.)
.023″/.071″ inc. (to about 1000 lbs.)	.023″/.071″ inc. (up to about 1000 lbs.)

COIL DIMENSIONS ON REQUEST

Customer Satisfaction Is Our No. 1 Job DSC*

*A DSC Trade-Mark

DETROIT STEEL CORPORATION

GENERAL SALES OFFICE, BOX 4308, DETROIT 9, MICHIGAN

CUSTOMER "REP" OFFICES:

Charlotte, N. C., Chicago, Cincinnati, Cleveland, Columbus, Ohio, Dayton, Ohio, Detroit, Grand Rapids, Mich., Hamden (New Haven), Conn., Houston, Texas, Indianapolis, Jackson, Mich., Louisville, Ky., Milwaukee, Wis., New York City, Rochester, N. Y., St. Louis, Toledo, Worcester, Mass.

The PROOF of DSC STEEL is in its PERFORMANCE on Your Job

DSC PRODUCTS: Coke . . . Coal Chemicals . . . Pig Iron . . . Basic Open Hearth Steel Ingots, Blooms, Slabs, Billets, Rods . . . HR and CR Sheet and Strip . . . Flat CR Spring Steel . . . Manufacturers' and H.C. Specialty Wire . . . Welded Wire Fabric

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Job report courtesy of
Superior Welding Company, Decatur, Ill.

How to get maximum corrosion resistance from Welded Stainless Steels

WELD WITH ARCOS

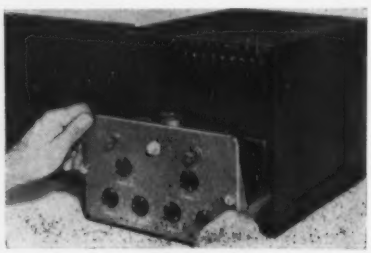
STAINLESS ELECTRODES

This reactor type vessel is used by the chemical industry to produce paints and resins. Effective resistance to corrosion depends largely upon the quality of its welded joints. Arcos CHROMEND HCN and CHROMEND K-LC Electrodes were selected to meet these critical demands. The inner vessel is 304 ELC clad carbon steel—all other parts in contact with the charge are also 304 ELC. Whatever *your* job, there's an Arcos Stainless weld metal of the right analysis for dependable results. ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.

DESIGN DIGEST

Magnetic Repeater Unit

A magnetic repeater unit can do the work of six conventional isolating amplifiers in automatic control. One transmitter can thus feed six control units because a single



signal produces six proportional outputs. Transistorized, the repeater has long life with low maintenance. (Leeds & Northrup Co.)

For more data circle No. 44 on postcard, p. 158

In-Line Drives

Two new large-size gear speed reducers have been added to a line of in-line drives. Rated up to 200 hp, they feature high overall efficiencies of 94 to 97 pct, with double, triple, and quadruple reductions available in AGMA ratios up to 440-to-1. Right-angle spiral bevel attach-

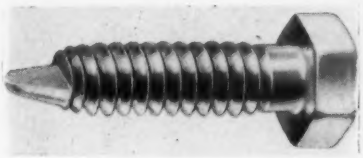
ments are available for mounting in any of 8 drive positions at 45-degree increments. Carburized and hardened final-stage helical gearing and precision-ground gear teeth give advantages in increased load-carrying capacity, reduced vibration and noise, and longer life and space

savings. Large-diameter shafting and oversize bearings have sufficient reserve capacity to handle the most severe overhung loads and shock conditions. A broad housing base insures stability and provides a large oil reservoir. (Philadelphia Gear Corp.)

For more data circle No. 45 on postcard, p. 153

Screw Drills, Taps Self

A self-drill, self-tap screw for use in sheet metal, plastic, and wood in a limited range of sizes for trial use by manufacturers. It is designed for power driving. Eliminating many

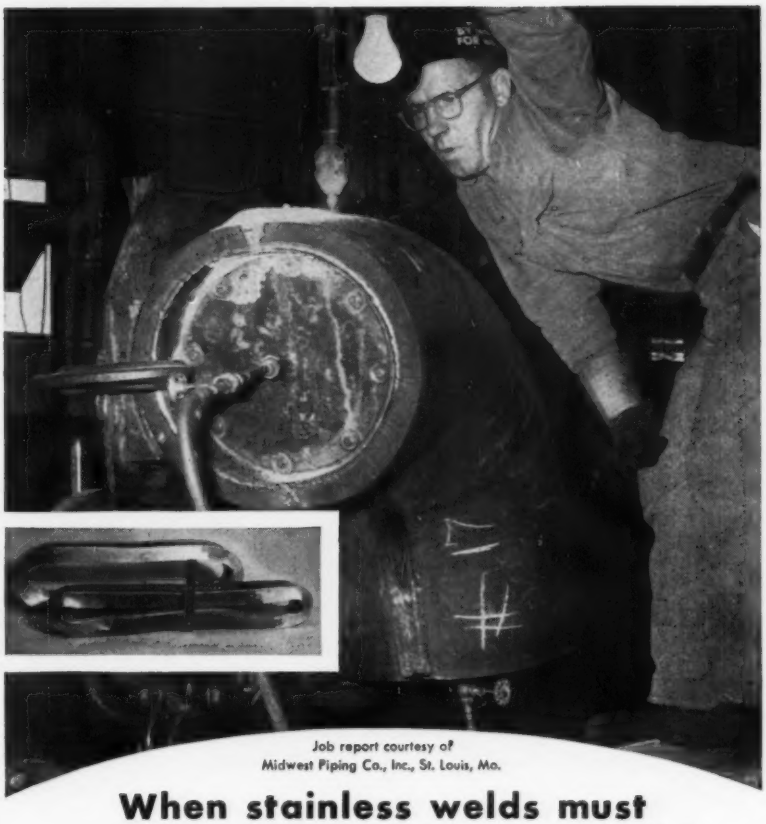


problems in drilling, positioning, and hole matching, it should effect substantial cost savings. (Reliance Div., Eaton Manufacturing Co.)

For more data circle No. 46 on postcard, p. 153

Natural Diamond Grit

Diamond Research Laboratory of Johannesburg, S. A., has developed a new method of grit selection which will result in 40 pct greater efficiency for resin-bonded grinding wheels. Previously, strong, blocky particles were considered best. However, it was determined that for best results in resin wheels natural diamond grit should have the smooth, blocky particles removed, leaving irregular or rough-surfaced diamond grit as the grinding agent. It was found that the smooth particles were more often torn from the soft resin before their full benefit was realized. Resinoid bond holds more rough particles until they are fully expended in grinding. Grinding of carbide also received attention in the study. It was determined that there is substantial variation in the hardness of the carbide, the material being hardest at and near the surface, and again as the opposite side is approached in grinding. The resinoid wheels show maximum efficiency in the hardest part of the carbide. It was emphasized that the

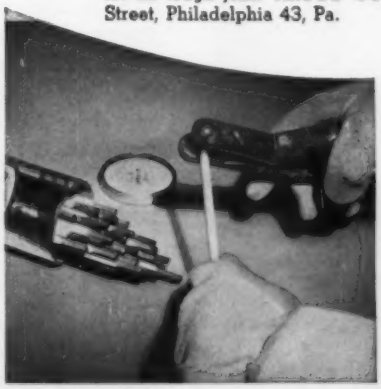


Job report courtesy of
Midwest Piping Co., Inc., St. Louis, Mo.

When stainless welds must pass the most rigid tests possible

USE ARCOS QUALITY FILLER METALS

This 16" diameter Type 304 stainless elbow is part of the reactor cooling system in an atomic powered ship. In welding the two halves, the first pass was made with Arcos Chromend K (Type 308) electrodes. The balance of the joint was submerged arc welded with Arcosite Bonded Flux and Chromenar K (Type 308) wire. The inset shows results of a dramatic test of the Arcos weld metal so produced. A 2½" ring, cut from an elbow, was given the normal bend test—and then completely flattened—without a crack! Such performance is the reason why Arcos is preferred for all tough jobs. ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.



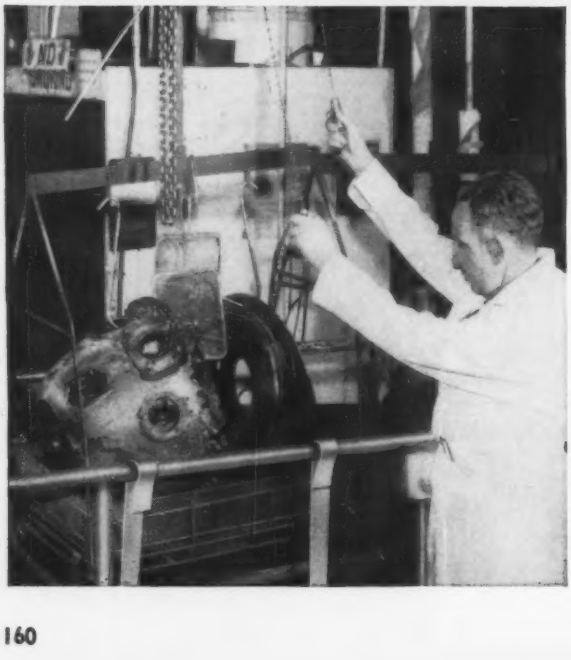
Arcos Chromend K
(Stainless) Electrodes

Arcos Chromenar K Bare Wire
and Arcosite Bonded Flux

"COLUMBIA-SOUTHERN to be highly satisfactory for

says Mr. G. M. Pomeroy, Plant Engineer, Pacific Airmotive Corporation, Burbank, California

"Aircraft engine parts must be clean, and only the highest quality cleaning materials will do the job without damaging these expensive parts. Furthermore, maintenance costs are reduced because of reduction of manhours required for cleaning and maintaining of degreasers," says Mr. G. M. Pomeroy, PAC Plant Engineer.

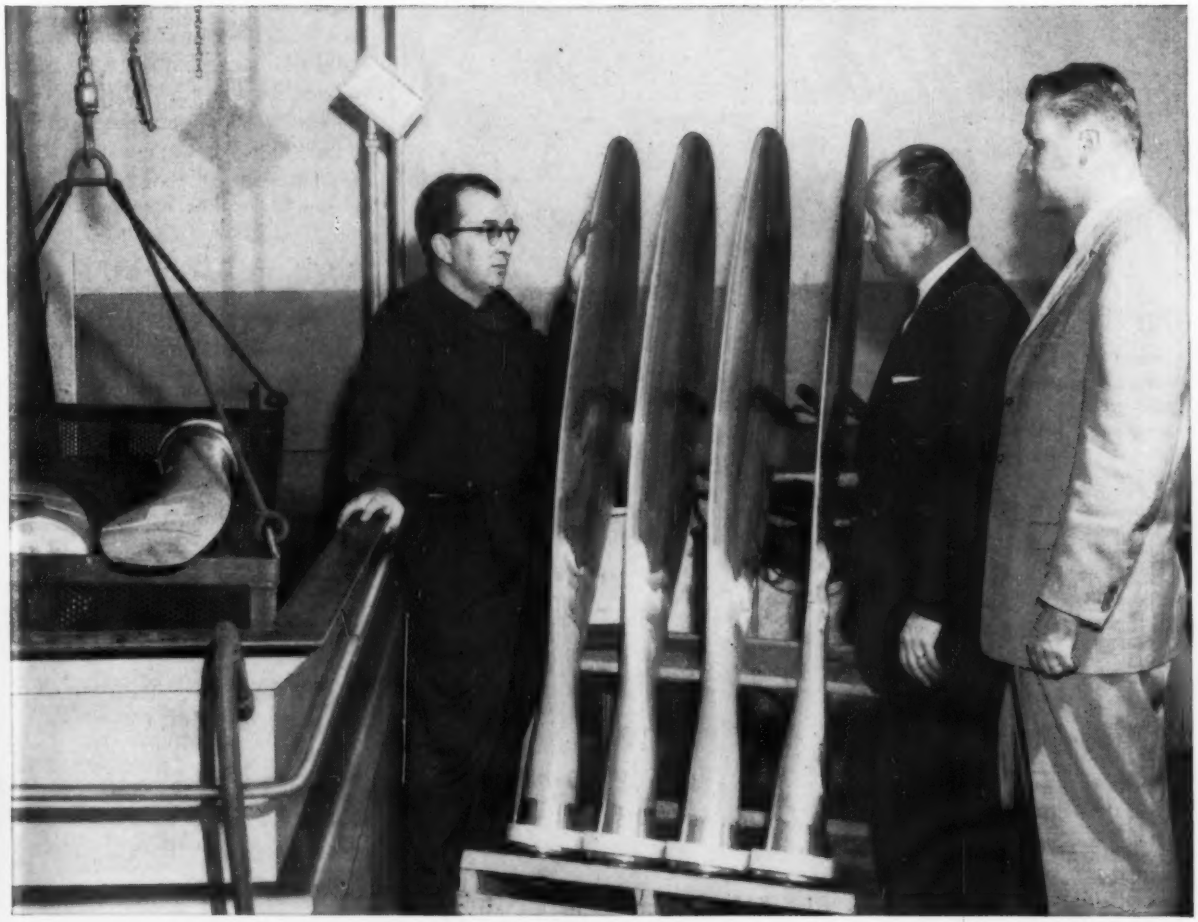


Pacific Airmotive Corporation's 30-year record of dependable aircraft and engine overhauls is unequalled in the aviation industry. It is the only FAA-approved private maintenance company authorized to overhaul the JT3 jet engine commercially. Pacific Airmotive Corporation's main plant is in Burbank, California.

"We have had no stoppage or damage to equipment since we started using Columbia-Southern Trichlor a year ago. It has extended our cleaning cycle per machine from 7 to 9 days, a saving of about 20 per cent. It also has reduced the actual downtime per machine during cleanout from 8 to 6 manhours, a further saving of 25 per cent."

"Before using Columbia-Southern Trichlor we tested many other trichlorethylenes. Many of them did an effective cleaning job, but the cleanout cycle was too frequent. Through the greater stability of Columbia-Southern Trichlor, we have extended that cycle and at the same time have increased the efficiency of our cleaning operation at Pacific Airmotive."

TRICHLOR has proved our high standard of operation"



Mr. G. M. Pomeroy (left), Plant Engineer Pacific Airmotive; Mr. Hal Wells (center), Vice President Crown Chemical & Engineering; Mr. H. R. Sherburne (right), Sales Representative Columbia-Southern.

"We have four degreasing machines which can handle up to 12,000 pounds of metal per hour. The solvent we use must be highly stabilized to protect the expensive parts that have to be cleaned. Some of these parts cost up to $12,000 apiece and we can't afford to risk the slightest damage in our cleaning operation. We have found Columbia-Southern Trichlor to be highly satisfactory for this purpose."

"Both producer and distributor—Columbia-Southern and Crown Chemical—give us excellent regular service in the form of technical help. This excellent service and the great efficiency of the solvent is very much appreciated and is a real asset to our operation."

"I can honestly state that after conclusive tests on the production line, Columbia-Southern Trichlor has provided greater savings and most efficiency in our maintenance of degreasers."

For more information, contact our Pittsburgh address or any of the fourteen Columbia-Southern District Sales Offices

COLUMBIA-SOUTHERN CHEMICAL CORPORATION

A Subsidiary of Pittsburgh Plate Glass Company · One Gateway Center, Pittsburgh 22, Pennsylvania

DISTRICT OFFICES: Cincinnati · Charlotte · Chicago · Cleveland · Boston · New York · St. Louis · Minneapolis · New Orleans · Dallas · Houston Pittsburgh · Philadelphia · San Francisco. IN CANADA: Standard Chemical Limited

NOW...
select from a complete range of capacities and speeds...1/8 to 2 tons and 8 to 60 fpm.

important new models of the Lodestar® electric hoist

NEW MODELS in 1/2, 1 and 2 tons

LODESTAR FEATURES INCLUDE:

- Safe, Heavy Duty Performance
- Lowest Headroom
- Push Button Control
- Fully Enclosed Components
- Self-Adjusting Magnetic Brake
- Ultra-Modern Electric Braking
- CM-ALLOY Flexible Link Chain
- Minimum-Maintenance Operation
- Lifetime Lubrication

Request catalog and name of local stocking distributor.

LARGER CAPACITY and FASTER SPEEDS
...for speedier, lower cost materials handling

● Here's your opportunity to slash lifting and handling costs. Put these new Lodestars to work where their increased speeds and capacity match your maximum requirements. Many thousands already in service demonstrate that you, too, can benefit from more efficient handling, lowered costs and increased productivity.

CM HOISTS

CHISHOLM-MOORE HOIST DIVISION
Columbus McKinnon Chain Corporation
TONAWANDA, N.Y.
NEW YORK • CHICAGO • CLEVELAND
In Canada: McKinnon Columbus Chain Ltd., St. Catharines, Ont.

DESIGN DIGEST

new selected natural grit would be advantageous only for resinoid wheels. For harder bonds (metallic and vitreous) the stronger, blocky shapes are superior. Results of these tests have been turned over to Industrial Distributors Ltd., and selected natural grit for use in resinoid wheels will soon be available to users throughout the world. (Diamond Research Laboratory.)

For more data circle No. 47 on postcard, p. 153

Ceramic-MagnetPulleys

An improved line of ceramic-powered magnetic pulleys is available. A radially-oriented magnetic field makes these pulleys more effective than axial pulleys in removal

of medium and large tramp iron, expecially at higher belt speeds. Five standard diameters from 12 to 24 in., in belt widths from 12 in. up, are offered. (Eriez Mfg. Co.)

For more data circle No. 48 on postcard, p. 153

Speed Reducers

A new line of fin-and-fan-cooled speed reducers is available. They feature specially designed external

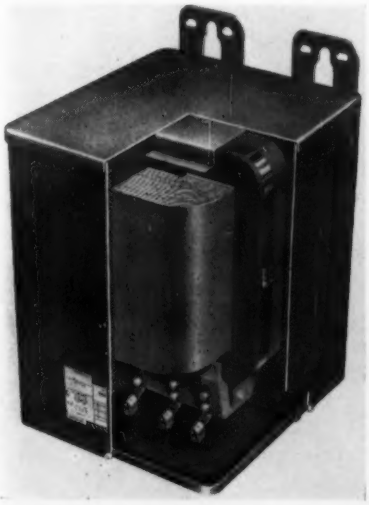
cooling fins plus a powered cooling fan to provide 50 pct more capacity with no increase in size or weight. Using heavy-duty worm-and-gear

reduction, they also feature heavy-capacity bearings, center distances from 1.33 to 5.25 in., and improved heat - dissipation characteristics. (The Ohio Gear Co.)

For more data circle No. 49 on postcard, p. 153

High-Volt Transformers

Voltage ratings of a line of dry-type general-purpose transformers have been extended to 5 kv. The higher voltages are available on single-phase units, 10 kva and below, and three-phase units, 15 kva and below. These transformers, either in the 600- or 5000-v class, are particularly suited for applications such as serving lighting loads from power circuits or to step down voltages for



machine tools, fans, pumps, compressors, etc. Cores and coils are encapsulated in resin with high-grade electrical sand filler, providing a sealed unit that can be installed in hazardous areas. Volume is reduced 50 pct from previous air-insulated transformers. (Westinghouse Electric Corp.)

For more data circle No. 50 on postcard, p. 153

Synthetic Lubricant

A new synthetic high-temperature lubricant is minimizing wheel maintenance and cutting volume of lubricant consumed in use on kiln cars. Supplied for applications up to 1200°F, the grease is a blend of synthetic carrying agent, thickener, and solid lubricant. Greases used before broke down or froze. This new product has been found

Saves 85% gaging time!

"We estimate the DR-25 saves 85% of our time in checking hundreds of cylindrical plug gages every week. We save all the time formerly consumed in gage block build-ups to check each go and no-go gage. Our checks are more consistently accurate since we no longer have to ring gage blocks together carefully and let them cool back to room temperature to keep errors from developing. The generous spindle travel of the DR-25 accommodates a great range of work without accessories. We can now check thread plug and thread setting plug gages in a third of the time formerly required to check them with gage blocks and comparators. We've found the DR-25 rapidly pays for itself in accuracy and man-hours saved."

Charles McArthur,
Gage Engineer
Aeroquip Corporation
Jackson, Michigan

BAUSCH & LOMB
DR-25
OPTICAL GAGE

- **Direct scale reading to .0001"**
- **0" to 3" range without gage blocks**

Find out more about cutting inspection time and costs... MAIL COUPON TODAY

BAUSCH & LOMB
SINCE 1853

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BAUSCH & LOMB OPTICAL CO.
85242 St. Paul St., Rochester 2, N. Y.

☐ I'd like an on-the-job demonstration of a B&L DR-25 Optical Gage. No cost, no obligation.
☐ Please send Catalog D-285.

Name, Title .....
Company .....
Address .....
City ..... Zone ..... State .....

to eliminate freezing and provide long-term lubricity. (E. F. Houghton & Co.)

For more data circle No. 51 on postcard, p. 153

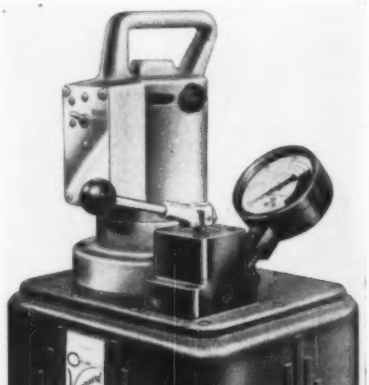
Feeder Kicker

A new electronic device permits automatically controlled feeding of small to subminiature parts by continuously breaking up jams or inertia due to various causes. An automatically timed and adjustable energy impulse different from the regular amplitude jars the parts into further movement. With this equipment, feeding speeds as slow as one per minute can be achieved, if desired. The standard model is designed for use in conjunction with feeders operating between 0.6 and 1.2 amp; special units are available for larger feeders. (Affiliated Manufacturers, Inc.)

For more data circle No. 52 on postcard, p. 153

High-Pressure Pump

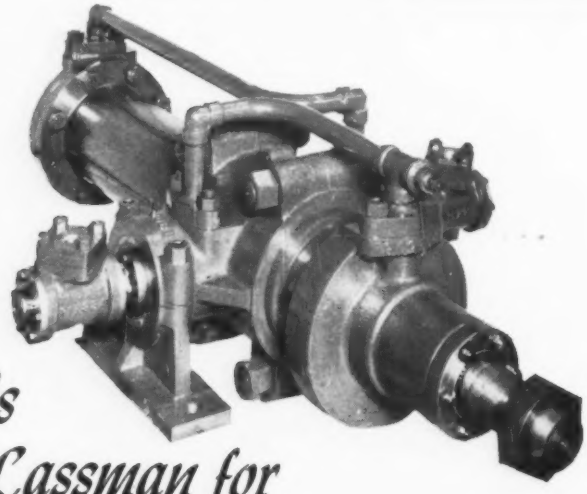
A two-stage hydraulic pump delivers from 600 cu in. per minute at 100 psi to 50 cu in. per minute at 10,000 psi, and weighs only 45 lb. Exceptional speed at low pressure means that cylinder pistons can be adjusted to the work faster before the high-pressure stage is needed. Quiet-operating, it is driven by a universal motor, 1⅛ hp, 12,000 rpm, ac/dc. Motors are available for either 115 or 230 v. Overall dimensions are 10¾ x 12⅝ x 17½ in. A variety of valves, controls, and accessories are available and can be easily mounted for specific requirements. (Owatonna Tool Co.)



For more data circle No. 53 on postcard, p. 153

High-Temp Tubing

Small tubing of A-286, an austenitic alloy of 55 pct iron, 25 pct nickel, and 15 pct chromium is available for high-temperature ap-



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HYDRAULIC EQUIPMENT

Lassman Trunnion Cylinders offer extra features unobtainable in the usual designs. Among these are hydraulically balanced swivel pipe connections which permit rigid installation of piping, eliminating hoses or other fittings and their incident troubles. This is particularly important when considering large cylinders or high pressures.

This style of cylinder is only one of many, all of which embody "extra" features of design and construction; features that, as a result of our long experience in building heavy-duty hydraulic equipment, mean trouble-free performance.

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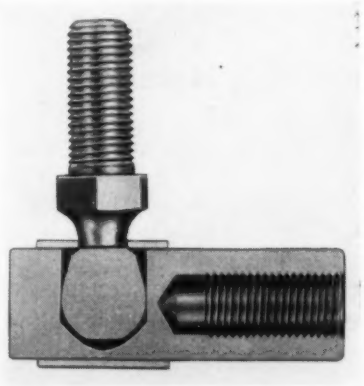
plications. It has high strength to 1300°F and good oxidation resistance to 1800°F, plus outstanding properties at subzero temperatures. Thus, a variety of rocket, jet, and gas-turbine applications are envisioned. (Superior Tube Co.)

For more data circle No. 54 on postcard, p. 153

New Ball-Joint Design

A new ball-joint design concept doubles life compared to convention designs and reduces the number of parts in the assembly. Functional dimensions are interchangeable with SAE and other published standards. A complete line is available. Increased life and shock-resistance are obtained through de-



parture from the conventional spherical shape and use of a shorter, heavier neck. The female part consists in its entirety of the joint body and a spring-steel retaining sleeve, eliminating spring loading mechanisms, end screws, and cotter pins. Samples are available. (Superior Ball Joint Corp.)

For more data circle No. 55 on postcard, p. 153

Timing-Belt Drive

Constructed with steel cable cords imbedded in neoprene fully molded with nylon base fabric, a new timing belt drive is highly versatile in application, load range, and speed range. Speeds from 0 to 16,000 fpm are possible. Since it does not depend on friction, there is no need for high initial tensions. Small pulleys, short centers, narrow belts, and high capacities are features gained, to reduce space requirements. Heat is not built up. These drives are available in five "pitches": 1/5, ⅜, ½, ⅞, and 1¼ in. All 1/5-in. pitch pulleys are bored to size; bushings are available to accommodate various shaft diameters for the other sizes. (Allis-Chalmers Mfg. Co.)

For more data circle No. 56 on postcard, p. 153

Nuclear Thickness Gage

An ultrasensitive nuclear thickness gage measures material thickness to two-millionths, thickness of protective coatings to within 0.01 pct of total material thickness, and changes in basic unit weight of 0.005 mg/sq cm. In continuous-process industries, it provides automatic uniform product consistency when used in conjunction with automatic controls. (Radiation Counter Laboratories, Inc.)

For more data circle No. 57 on postcard, p. 153

Precision Pinion Shafts

An expanded line of precision

Hammond
AUTOMATICS
cut
GRINDING · POLISHING ·
BUFFING · DEBURRING ·
costs

Your finishing problems can be solved by the proper application of Hammond Automatic or Semi-Automatic equipment. Standard heads, turrets and conveyors are used wherever possible to keep costs down. Special machines are designed for the unusual job.

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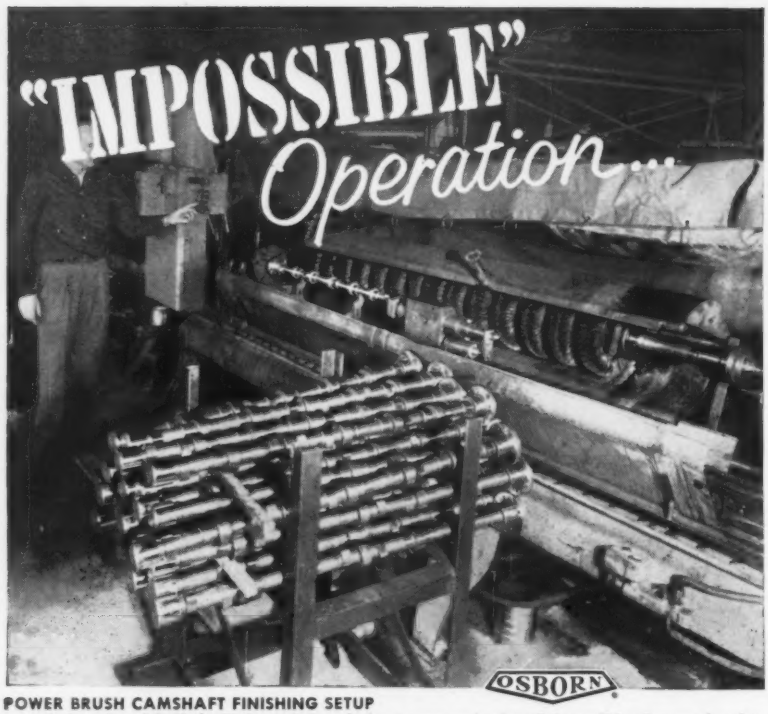


POWER BRUSH CAMSHAFT FINISHING SETUP *was designed and built by Universal Camshaft Co., Muskegon Heights, Michigan. It incorporates lathe bed, air cylinder, 50 hp motor and a gang-unit of 14 Osborn Disc-Center® brushes. Operation deburrs cams and cleans plating chips from steel shafts automatically.*

UNTIL OSBORN POWER BRUSHING tackled this camshaft finishing job

This manufacturer had been finishing steel camshafts by a slow, costly off-hand method that resulted in pitted shafts and inconsistent deburring . . . high scrap loss. It looked like an "impossible" operation to improve.

But, today—using this ingenious power brushing method developed by the manufacturer's engineers and an Osborn field specialist—the job is done rapidly, economically with extremely high quality output.

An operator simply loads the steel shaft into a fixture. The Osborn Disc-Center® Brush unit drops against the work at pre-set pressure and time cycle . . . also reciprocates back and forth along the shaft. This action allows deburring cams of various type steel shafts *without* re-spacing the brushing unit. Plating chips are thoroughly cleaned from the main shaft at the same time.

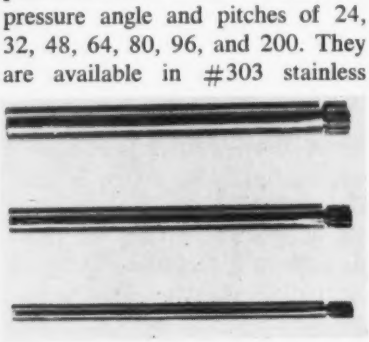
With modern Osborn Power Brushing—this "impossible" job became a high-output, low-cost, quality-controlled operation.

An **O**sborn **B**rushing **A**nalysis—made in your plant at no obligation—can pinpoint new savings and better finishing methods for you, too. Write us for details. *The Osborn Manufacturing Company, Dept. F-82, Cleveland 14, Ohio.*

Osborn Brushes

POWER, PAINT AND MAINTENANCE BRUSHES • BRUSHING METHODS
BRUSHING MACHINES • FOUNDRY PRODUCTION MACHINERY

pinion shafts is available with 20° pressure angle and pitches of 24, 32, 48, 64, 80, 96, and 200. They are available in #303 stainless



steel, in a wide range of shaft diameters and lengths. (PIC Design Corp.)

For more data circle No. 58 on postcard, p. 153

Finishing Material

A new material produces a unique finish on fabricated metals at low cost. It is made of nylon web impregnated with fine grades of abrasive. Already in use on stainless and aluminum, it has also been used successfully on most nonferrous metals. Use before pickling has

been found to cut pickling time and produce cleaner steel. It is supplied in ¼-in.-wide discs, which can be ganged on a spindle to any width. Conformable, it easily takes the shape of any workpiece. (Minnesota Mining and Mfg. Co.)

For more data circle No. 59 on postcard, p. 153

Turret Cutoff Tool

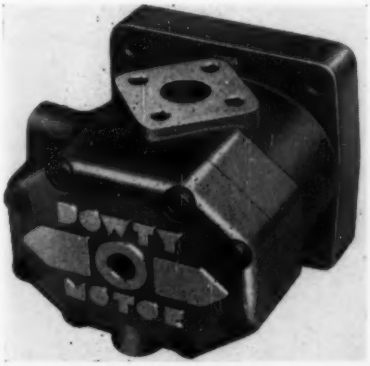
An automatic cutoff tool for ram turret lathes eliminates hand traversing, provides an additional tool station, increases production on cut-off operations, and reduces fatigue.

Easily attached, it can be swung aside when not required. With rapid approach to work and rapid return cycle, it has a feed rate adjustable from 0 to 120 ipm. It is tough and will not chatter. Various types of actuating control are offered. (Lloyd Tool Corp.)

For more data circle No. 60 on postcard, p. 153

Gear Motors

Hydraulic gear motors with outputs to 25 hp have been added to the line of Dowty equipment in the U. S. These reversible motors have a speed range of 300 to 3000 rpm and overall efficiencies up to 80 pct.



Cartridge construction eliminates alignment difficulties. There are five motor sizes in the line. (Berry Hydraulics, a Div. of Oliver Tyrone Corp.)

For more data circle No. 61 on postcard, p. 153

High-Strength Tubing

Small, cold-drawn tubing of a new precipitation-hardening stainless steel analysis with excellent mechanical properties at room temperatures and outstanding ones at elevated temperatures, is now available. The analysis contains approximately 15 pct chromium, 7 pct nickel, 3 pct molybdenum, and 1 pct aluminum. The molybdenum increases the mechanical properties at temperatures up to 1000°F. Sizes from 0.012 to 1.125 in. OD, in walls from 0.002 to 0.035 in., depending on diam, are available, in three standard drawn tempers. (Superior Tube Co.)

For more data circle No. 62 on postcard, p. 153

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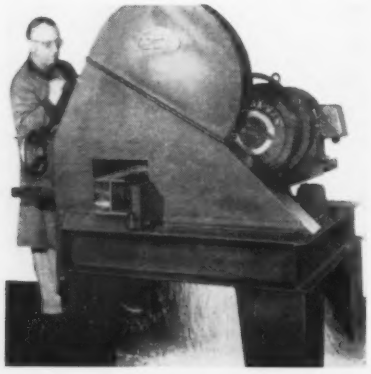
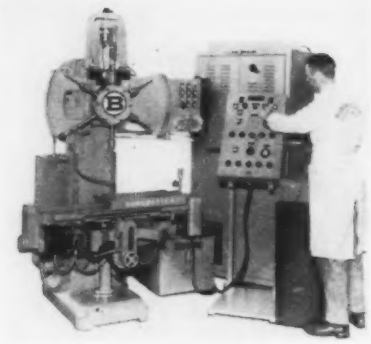


Higher-Power Cutoff Saw for Heavier Work

Boosting horsepower to 30 hp has provided a cutoff saw for heavier jobs than were heretofore possible with this type machine. It offers friction or abrasive cutting and can be used with a grinding wheel. Priced reasonably, this machine also includes a new dynamic suspension system that permits light fingertip feed without springs, counterweights, or adjustments. Oscillating feed can be used at the operator's option, to move the blade back and forth in the cutting plane, thus reducing the arc of blade contact, increasing blade life and cutting speed, and making for cleaner sawing. Blade capacity is 30 in., and sections up to 8 x 8 in. can be held for sawing. (Ty-Sa-Man Machine Co.)

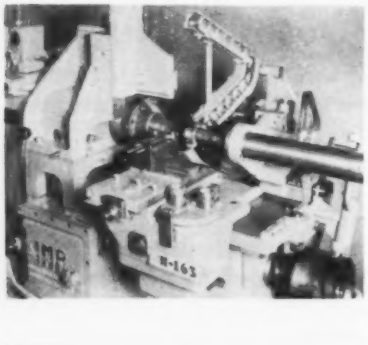
For more data circle No. 63 on postcard, p. 153



Hydraulic Circuit Improves Drilling Machines

A new improved hydraulic circuit for the Burgmaster 2 BH and 3 BH automatic hydraulic turret drilling, tapping, and boring machines insures a positive constant feed rate, whether cutting air or actually machining a part. In tapping, it prevents pulling out the last thread or opening up the size of the threaded hole. Addition to the circuit of a pressure-compensating flow-control valve permits accurate calibration of the flow meter, which indicates spindle speed in ipm. This circuitry is on all new machines and is available in kit form for reworking older models. (M. R. Crossman Co.)

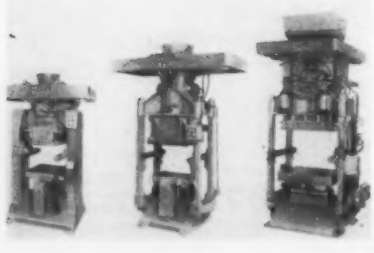
For more data circle No. 64 on postcard, p. 153



Automatic Loader Ups Output, Cuts Fatigue

Elimination of operator fatigue, acceleration of output, and improved quality control result from using an automatic loader with the IMP Lo-Swing automatic lathe. It feeds the couplings shown into a cradle where they are picked up by an injector head and inserted into an air chuck. The piece is machined, automatically ejected, picked up by a safety finger, and dropped on an evacuation chute. The machine cannot get out of time, as all movements are controlled from cams revolving at the same speed as the main camshaft. (Seneca Falls Machine Co.)

For more data circle No. 65 on postcard, p. 153

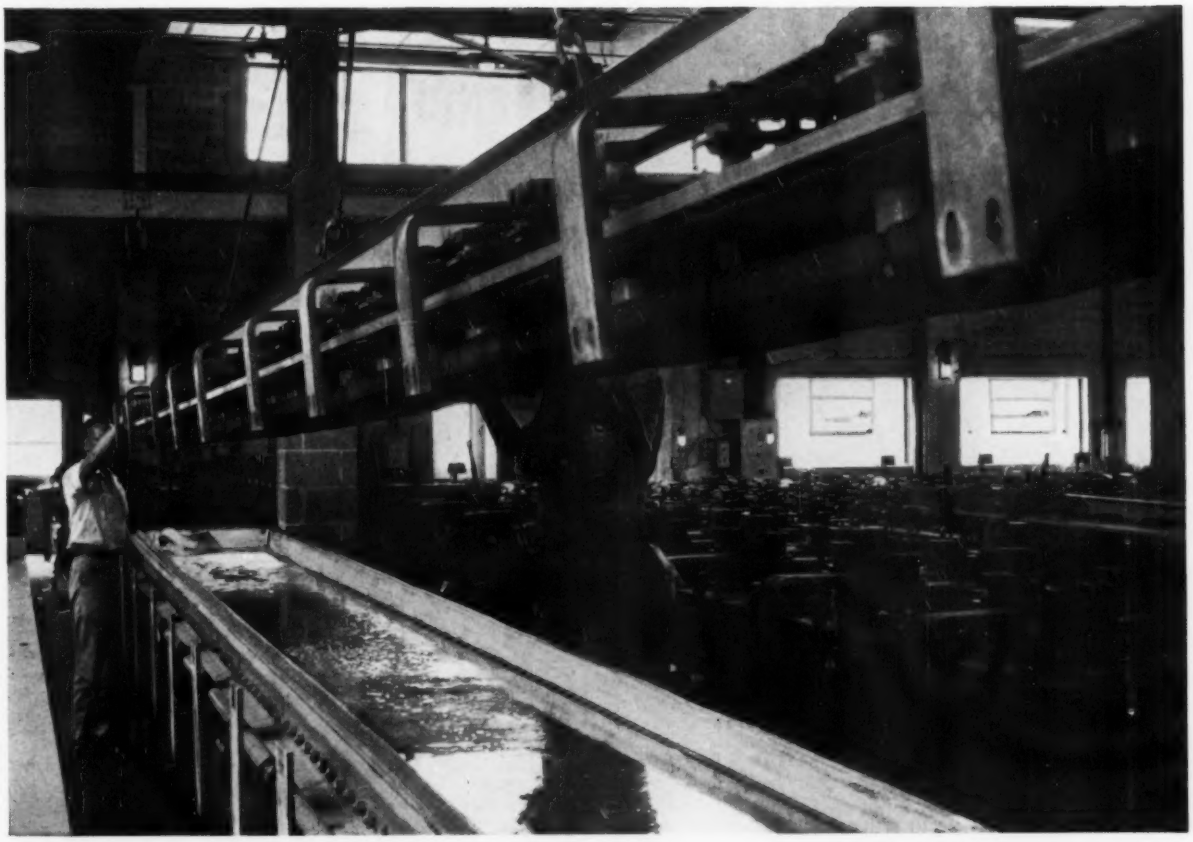


Blows, Squeezes, and Strips Molds Fast

Recently developed is a line of high-production, automatic molding machines. This machine blows, hydraulically squeezes, and strips green sand molds in cycle times of less than 12 seconds, affording low-cost production of hard, accurate, uniform molds and superior casting finish. In operation, a set volume of sand is blown into the mold, which is then squeezed to any desired degree of hardness. Simple design and compact construction are featured. (The Osborn Mfg. Co.)

For more data circle No. 66 on postcard, p. 153

PERMOBOND LININGS



252 metal cells are resistant to chlorine and chlorinated salt solutions

This plant of Olin Mathieson Chemical Corporation at McIntosh, Alabama, produces hundreds of tons of chlorine daily. Because chlorine and chlorine salt solutions destroy metal in a matter of hours, the 252 carbon steel cells used here are protected with U. S. Permobond® Linings S5471. This is a special compound of Permobond Linings that has been successfully used by producers of chlorine for the past several years to protect the metal parts in electrolytic amalgam cells. This Permobond S5471 is the *right* lining for all chemical processors using this highly corrosive basic chemical.

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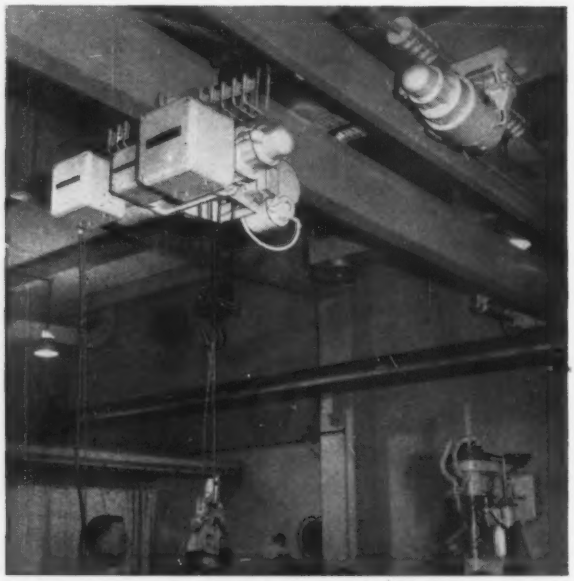
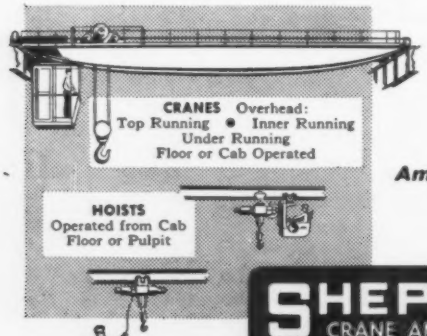


You can be certain of years of thrifty, dependable service when you invest in a Shepard Niles hoist. Long after you have written off the original cost, your Shepard Niles hoist will still be speeding raw materials and work-in-process through the air.

Choose from medium and heavy duty capacities with slow, medium or fast speeds . . . built for cycle duty, heavy intermittent duty, medium duty and light occasional service . . . available with short to long lifts, standard or close headroom, manual or magnetic controls.

Send for illustrated Hoist bulletin today . . . or ask that a Shepard Niles representative call—there's NO OBLIGATION.



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NEW EQUIPMENT

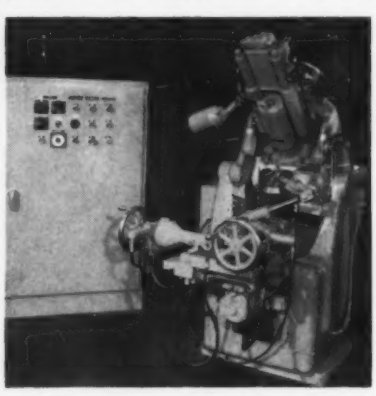
Ultrasonic Flaw Gage

A low-cost, portable, reliable ultrasonic flaw detector is available. It uses the pulse-echo detection principle, with display on a cathode-ray oscilloscope. Variations in the normal pattern indicate a flaw or discontinuity. Easy to operate, it runs on standard house current, and can be used on almost any material. (Branson Instruments, Inc.)

For more data circle No. 67 on postcard, p. 153

Cutter Grinder

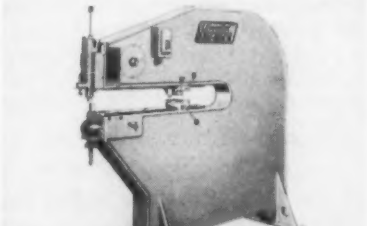
A semiautomatic cutter grinder is announced as a companion to a recently introduced automatic cutter grinder. This equipment is available either as a complete new unit or as a retrofit kit for recent hand cutter grinders. (The Ingersoll Milling Machine Co.)



For more data circle No. 68 on postcard, p. 153

Shearing Machine

A new model is a line of shearing, forming, and piercing machines has an edge-cutting capacity of 9/32 in. in mild steel plate and



3/16 in. in stainless. Throat depth is 49¼ in., permitting circle cutting up to 48 in. diam inside the throat. Operating with a reciprocating upper and stationary lower tool, it has an infinite range of strokes from 0.035 in. through 0.250 in., stroke rate being automatically regulated when stroke length is set. Cutting speed is up to 36 fpm, with 1750 to 3500 cuts per minute. It cuts all shapes, slots and louvers, and performs beading, planishing, flanging, edge-bending, joggling, nibbling, and hole-piercing operations. (Lennox Tool and Machine Builders.)

For more data circle No. 69 on postcard, p. 153

½-hp Speed Reducer

Double capacity from light drill-press and lathe equipment has been obtained quickly and economically with a new machine attachment. This quick-change (belt-driven) speed reducer makes possible a greater number of machine speeds and provides slow enough speeds for reaming, tapping, boring, and

similar operations on light-duty machines. It also serves as a torque multiplier in the reduced speed ranges, permitting heavier-than-normal cuts to be taken in all operations. It can be attached to all standard machine tools for an unlimited range of reduction ratios. (The Pull-Gear Co.)

For more data circle No. 70 on postcard, p. 153

Vise and V-Block

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At the same time, a CrysCoated surface prevents the formation of rust . . . even prevents rust spreading from a deep scratch. Both metal and paint are safeguarded. The product looks better, lasts longer.

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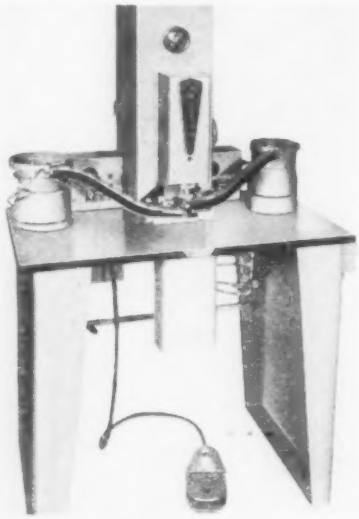
tool steel precision-ground to 0.0004 in. It measures 2 x 2 x 5 in., with 1-in. jaw height. It can be used turned around, upside down, on all four sides or end. (New Town Machine & Tool Co., Inc.)

For more data circle No. 71 on postcard, p. 153

Inserting Machine

An automatic inserting machine can be used on a wide variety of small parts. Parts are fed from two hoppers through chutes into proper position, where they are lightly pressed into place by a cam-operated ram easily adjustable for force, speed, and stroke. The cycle is



actuated by a two-position foot switch, to give operator full control at any point in the cycle. Insertion rates to 3000 pieces per hour are feasible. Interchangeable tooling allows a wide range of possible uses on such parts as terminals, connectors, pins, studs, bushings, and many types of fasteners. (Hill Machine Co.)

For more data circle No. 72 on postcard, p. 153

Electro-Slag Welding

Electro-slag welding involves an electrode wire melting into a bath of molten slag and molten weld metal, which rises vertically to produce the weld. A welding machine using this process is now available. High-quality butt welds up to 20 in. thick can be made in one pass. Other advantages are: (1) no special edge preparation, (2) less time, (3) 1/5 less current, (4) less welding rod, and (5) less flux. (Arcos Corp.)

For more data circle No. 73 on postcard, p. 153

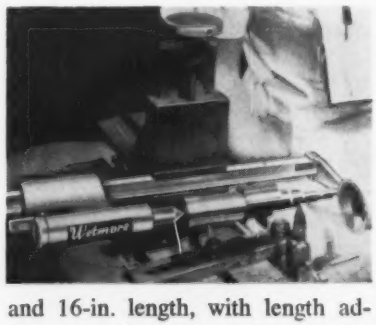
Measures Coatings

A non-destructive coating thickness tester enables rapid, accurate, and non-destructive measurement of coating thickness, on all metallic and non-metallic coatings. It can also be used for sorting metals and alloys. It comes with four probes for different thicknesses. Small and lightweight, it operates electrically, on the eddy-current principle. (Unit Process Assemblies, Inc.)

For more data circle No. 74 on postcard, p. 153

Center-Holding Fixture

An inexpensive center-holding fixture speeds grinding and aids accuracy for grinding or inspecting drills, reamers, counterbores, end mills, step tools, and ID form tools. It has a work capacity of 6-in. diam



and 16-in. length, with length adjustment clamped against spring pressure to prevent end play during grinding. It is readily mounted on the universal vise of any tool and cutter grinder. (Westmore Tool & Engineering Co.)

For more data circle No. 75 on postcard, p. 153

Tough Carbide

Availability of brand VR-77 carbide in 34 new stock sizes is announced, including many sizes of square and triangular throwaway inserts for both positive- and negative-rake toolholders. This grade's ex-

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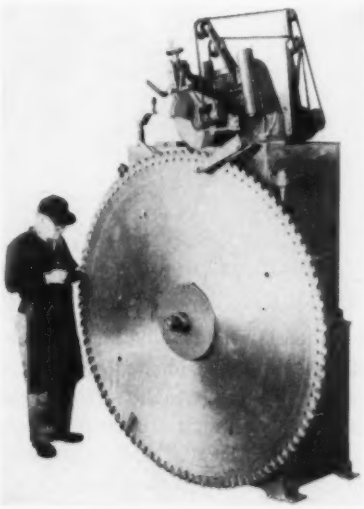
cellent shock resistance and high resistance to heat deformation recommend it for heavy roughing and interrupted cutting of all steel types. (Vascoloy-Ramet Corp.)

For more data circle No. 76 on postcard, p. 153

Saw-Sharpening Machine

A heavy-duty metal-saw-sharpening machine is designed for sharpening all types of metalcutting saws up to 84 in. diam, hot or cold, with provision for automatically forming high and low teeth, and for al-



ternately beveling the tops of the high saw teeth. Saw teeth are generated by cam control, with a wide range of adjustment for tooth spacing and depth of teeth. Rugged in construction, it does precise work to fine finishes. (Hanchett Mfg. Co.)

For more data circle No. 77 on postcard, p. 153

Spring-Loaded Center

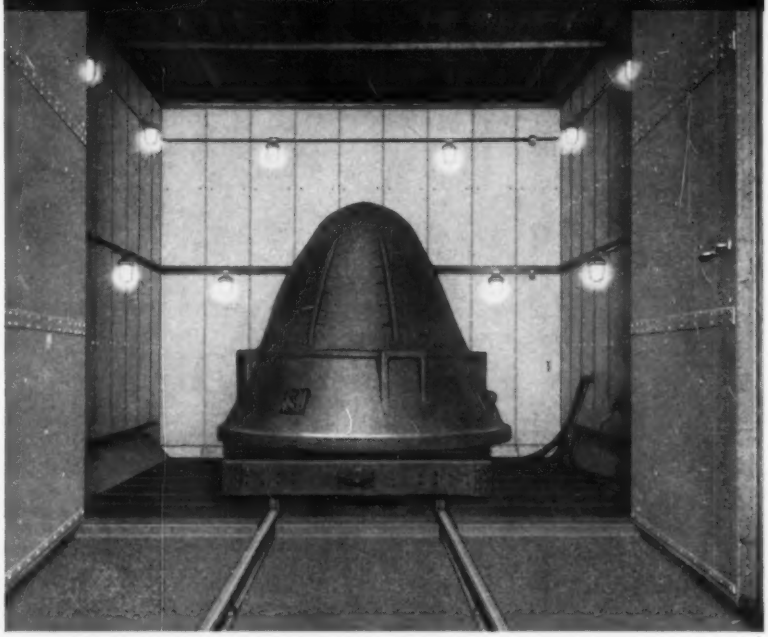
Not subject to ill effects of thermal expansion of mandrels or workpieces is a spring-loaded dead center. The end thrust can be adjusted to meet the requirements of each job. It is available in all common Morse taper sizes and can be supplied with straight or special tapered shanks and carbide-tipped points. (Chemtor Products Co.)

For more data circle No. 78 on postcard, p. 153

Vacuum Furnace

A packaged quartz tube furnace

SLY BLAST ROOMS



Complete, low-cost cleaning of castings, forgings, weldments, tanks, transportation equipment, structural parts is assured. Air blast cleaning exposes defects, saves machine tools, makes paint adhere. Rugged, thoroughly ventilated, Sly Blast Rooms are built in all types and sizes, with fully automatic abrasive handling systems. Work can be handled on monorail or car.

See SLY for Savings Down the Line

DUST CONTROL SYSTEMS
Unequaled experience in system design plus the most extensive dust filter line. *Dynaclone* and *Automatic-Continuous* for uninterrupted, 24-hour-a-day service. *Intermittent* for non-continuous applications. Plus *"Unit"* and *"Economy"* filters.

INDUSTRIAL OVENS
Conveyorized and batch type for better results and increased savings on all baking, drying, finishing, and aging applications.

ROD BAKERS
Pit type in complete range of sizes. Reduce drying time of lime-coated rods from 30 minutes to 5. Designed to save space and coil handling time.

TUMBLING MILLS
Continuous and batch type. Remove fins as they clean castings — saving hours of machining.

BLAST ROOMS
In all types and sizes, with full mechanical return of abrasives. Thoroughly ventilated. Built to withstand years of heavy use.

PURAIR HELMETS
Complete protection against even the finest dust. Lightweight, comfortable. Maximum visibility, complete freedom of head movement.

UNIFLO NOZZLES
Steel with tungsten carbide orifice lining outlasts hard iron nozzles 200 to 1. For shot, grit and sand blasting.

PLUS . . .
Wear-resistant "Slyblast" hose. "Purair" blower units. Air pressure regulators. Abrasive elevating and cleaning units. Pressure blast tanks. Blast cabinets. Tilted blast mills. Gloves, aprons, canvas suits, leggings.

SINCE 1870 SLY

SEND FOR CATALOG describing complete line.

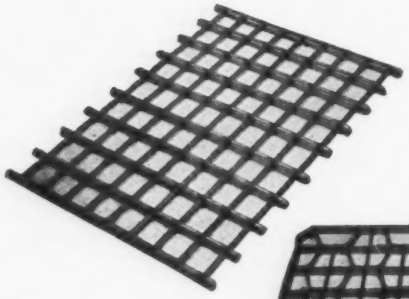
THE W. W. SLY MANUFACTURING CO.

4730 TRAIN AVENUE • CLEVELAND 1, OHIO
OFFICES IN PRINCIPAL CITIES

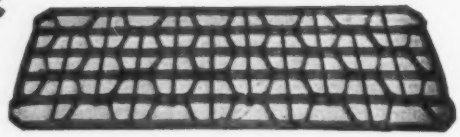
OVERSEAS LICENSEE: ANDREW AIR CONDITIONING LTD., LONDON S.W. 1, ENGLAND

ROLOCK
FABRICATED HEAT AND CORROSION RESISTANT ALLOYS

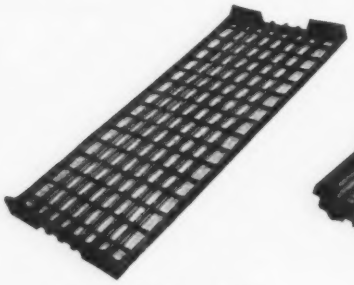
SILVER PLATTER SAVINGS
are served with these
ROLOCK TRAYS



"Pressure Welded"
Furnished 2-layer
or 3-layer



"Serpentine"



**"Pressure Welded"
with pusher pads**

**"Serpentine"
with load-retaining sides**

ROLLER HEARTH FURNACE users have found these two basic Rolock Tray designs . . . and many possible variations . . . at once efficient and economical.

Not only can Rolock design and construction reduce tray weight (often by 25% to 50%) and thus increase pay-load, but service records frequently show that tray life has doubled or tripled.

These worthwhile savings have resulted from Rolock's engineering approach to tray design, taking into consideration details of the furnace hearth, tray load and weight ratios, method of operation, temperature limits and gradients and many other factors.

Complementing correct design, Rolock's unique "Serpentine" and "Pressure-Welded" construction features have proved to be, in many installations, the answer to problems of rapid tray deterioration. That is why Rolock today is a major supplier of furnace trays of these and many special types.

Why not make your own test. Let Rolock design and build your next replacements.

SALES AND SERVICE REPRESENTATIVES FROM COAST TO COAST

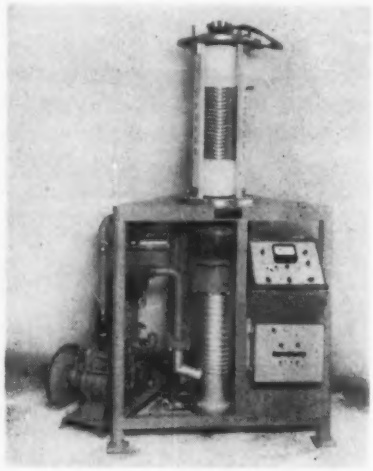
ROLOCK INC., 1362 KINGS HIGHWAY, FAIRFIELD, CONN.

JOB-ENGINEERED for better work
Easier Operation, Lower Cost

1RL59

NEW EQUIPMENT

and pumping system is designed for laboratory melting, heat-treating, or sintering operations up to 3000°C at pressures around 0.01 micron. High pumping capacity, good vacuum, and inside atmospheric cleanliness are provided by a 6-in. oil-diffusion pump. A hinged top per-



mits loading and unloading without disassembly. A shielded sight port with wiper is provided for observation and pyrometric measurements. Insulation, heat shielding, and mechanisms are customized. (Vacuum Specialties Co., Inc.)

For more data circle No. 79 on postcard, p. 153

Coil Cradles

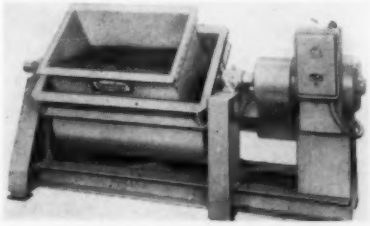
New design features in a line of heavy-duty coil cradles increase strength and rigidity of frame and add to efficiency and operator convenience. Greater width capacity is available. Guide plates are now more rigidly supported. Pinch rolls are furnished as standard equipment in this series, which is available in coil weights up to 20,000 lb, with coil widths to 50 in. (Benchmaster Mfg. Co.)

For more data circle No. 80 on postcard, p. 153

Vibratory Finisher

A vibratory finishing machine is available for deburring, descaling, cleaning, burnishing, and surface refinement of metal parts. It has a 5-cu ft capacity for the load of parts and media. Vibrating ampli-

tude is adjustable to 7 settings from 1/64 to ¼ in. at a frequency of 1800 vpm. The container pivots for dumping, and is actuated by

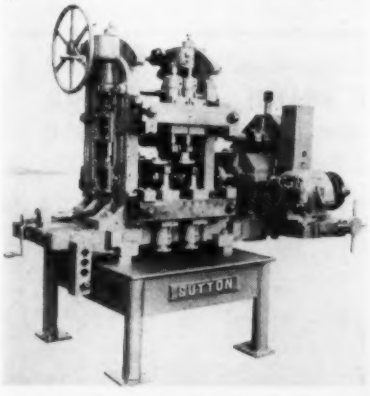


overhead hoist or by optional push-button-controlled motorized attachments. (Almco, Queen Products Div. of King-Seeley Corp.)

For more data circle No. 81 on postcard, p. 153

Contour Correcter

A contour-correcting machine corrects cross-sectional distortions of aluminum extrusions to extremely close tolerances. It handles flat sections up to 14 in. wide and multiple corrections of shapes circumscribed by a 9-in. circle in one pass. The correction mechanism, which consists of two main-drive spindles



with rolls, is adjustable to accommodate the many different cross-sectional distortions that occur in extrusion and heat-treatment of today's complex shapes. The machine is available in various sizes and capacities. (Sutton Engineering Co.)

For more data circle No. 82 on postcard, p. 153

Relieving Fixture

A relieving fixture has been designed for producing S-points on twist drills, providing proper relief in sharpening countersinks and de-

Ask Standard

how to cut costs with conveyors

Standard gravity roller conveyors like this are modest in cost, easy to install and maintain.

Conveyor system helps Airtemp up compressor parts production 40%

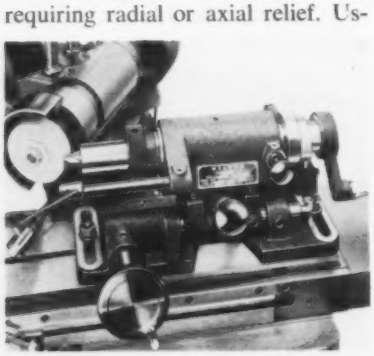
To handle stepped-up demands for residential and industrial air conditioners, the Airtemp Division of the Chrysler Corporation undertook an extensive re-tooling program. On one compressor crankcase line, for example, they installed 17 new machine tools . . . connected them all with Standard gravity roller conveyors. Result — two hours saving per case, production up 40%.

If you're planning on modernizing or retooling it will pay you, too, to find out how Standard conveyors can complement new equipment . . . give you lower overall costs and greater productive efficiency. STANDARD CONVEYOR COMPANY, North St. Paul 9, Minnesota. Sales and Service in Principal cities.

To expedite shipping or stocking and reduce handling costs, investigate Standard lightweight portable roller conveyors (right) or the portable, self-powered HANDIBELT conveyor (left), which can be used horizontally or at varying incline or decline angles.

For details — contact the Standard representative listed in the classified phone book or write direct. Ask for Bulletin M-6.

burring tools, and sharpening taps. It may be adapted to sharpening a wide variety of other cutting tools requiring radial or axial relief. Us-



able with most tool and cutter grinders, it has a fine feed for longitudinal travel. (The Weldon Tool Co.)

For more data circle No. 83 on postcard, p. 153

Forge Die Cutters

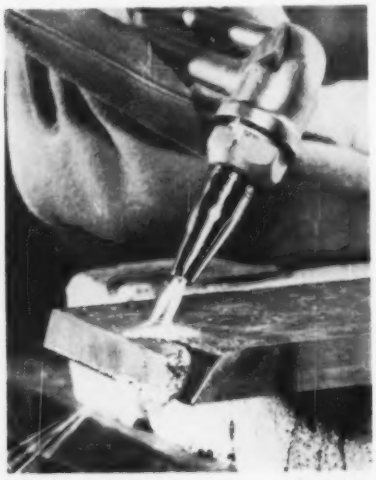
A line of metalcutting tools made expressly for the forge die sinking trade is announced. They are made

of a new type steel with special heattreat to handle today's harder, tougher forge die blocks, yet are reported to suffer less chipping or breakage than tools used heretofore. (Edco Tool Co.)

For more data circle No. 84 on postcard, p. 153

Flame-Cutting Nozzles

A new line of improved flame-cutting nozzles for use with acetylene or fuel gas has been introduced. Included are bendable nozzles for riser removal, and nozzles for fin washing, general cutting, and high-speed mechanized shape-cutting. Increased cutting speeds are possible with a new series of two-piece nozzles for use with natural gas, featuring from 12 to 20 small outlets for preheat gases, and a divergent nozzle bore design that increases the speed of the gas leav-



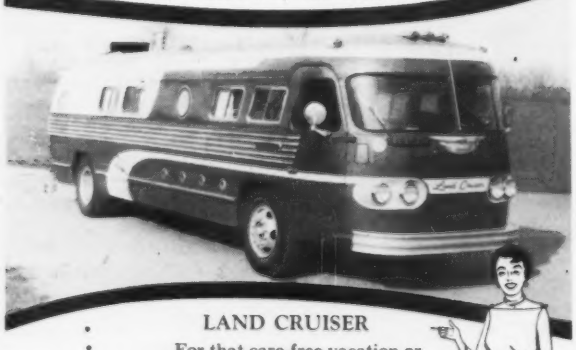
ing the nozzle by 20 pct. (Linde Co., Div. of Union Carbide Corp.)

For more data circle No. 85 on postcard, p. 153

20-Ton Bending Press

A new, improved 20-ton press bends tubing, pipe, and certain rolled or extruded shapes. It does high-speed progressive bending of

WE *Custom* DESIGN
WITH *You* IN MIND...
SAFE, PRACTICAL, ALL-WEATHER!



LAND CRUISER

For that care-free vacation or important business trip, nothing matches the luxury and convenience of a custom-built Land Cruiser. YOUR needs become OUR business when personalized land travel is desired. Complete self-contained living accommodations to your requirements in various models, from 19 to 35 feet and beginning at $14,800.

Write for Brochure CD-4

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"Designers & Builders of Special Coach Modifications"
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CLY-DEL *can help YOU!*

ENGINEERING Use the Cly-Del Engineers for development help.

TOOL ROOM Use the Cly-Del Tool Room for advantages of time, accuracy, economy.

MANUFACTURING Use Cly-Del to keep your profitable production UP!

INSPECTION Use Cly-Del for guaranteed quality ... on time.

CONSULTATION WITHOUT OBLIGATION We will appreciate the opportunity to advise you and estimate your present and future requirements.

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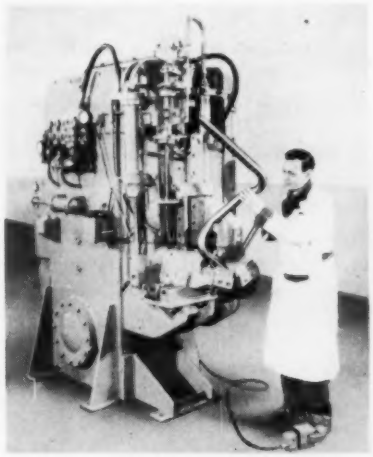
MANUFACTURING CO.
24 SHARON ROAD
WATERBURY, CONNECTICUT

workpieces requiring different angles and different bend planes on work up to maximum steel tube sizes of 2-in. OD x 0.083-in. wall. Major improvements include an offset bending ram for more work clearance and a ram deceleration

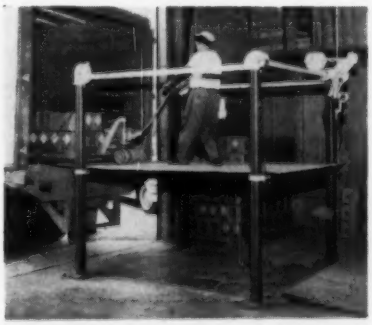


circuit for greater bending accuracy. It retains all the standard features of its predecessor, such as the 10-station angle-of-bend selector and the automatic resetting feature. (Pines Engineering Co., Inc.)

For more data circle No. 86 on postcard, p. 153

Electric Platform Lift

An electric-powered 6 x 8-ft platform lift with a capacity of 6000 lb features quick installation indoors



or out and ease of relocation from one work area to another. It has a rising height of 5½ ft. (Globe Hoist Co.)

For more data circle No. 87 on postcard, p. 153

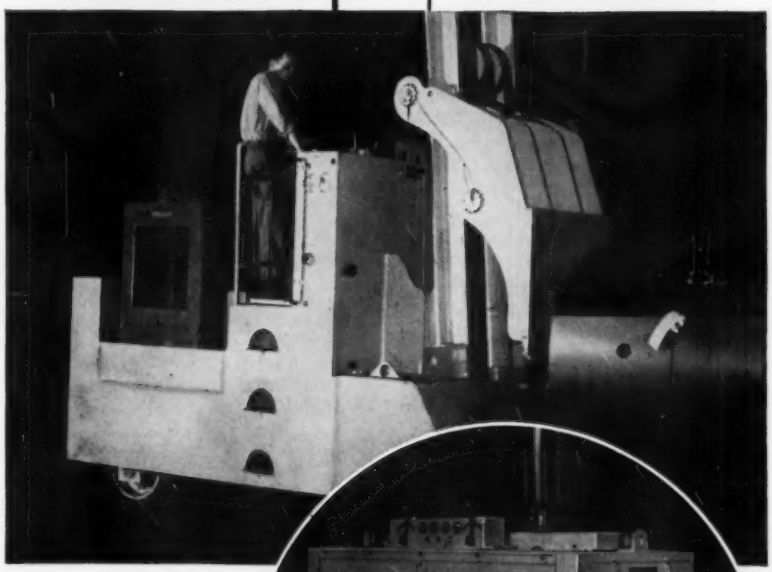
Universal Table

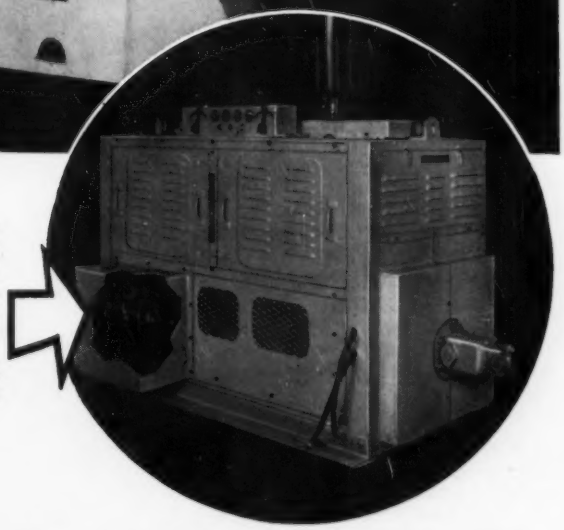
Providing for unlimited position control, a universal table affords great flexibility for milling, drilling, and shaping. Both upper and low-

New Diesel-Electric "Power Package" Does Both Jobs Economically

1 GENERATES TRUCK MOTIVE POWER

2 DIRECT-DRIVES HYDRAULIC PUMP





Ready-Power Model RD9DX Diesel-Electric Unit with "power package" equipment. Tractive power is supplied on demand by a specially designed generator with separate excitation which produces only the energy required to do the job.

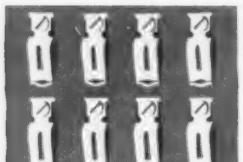
Ready-Power makes diesel-electric power doubly effective with a newly developed "power package" designed specifically for use with its "RD" Series Power Units. This remarkable new concept allows the unit to operate at *constant speed*, no load to full load, yet supplies full range of tractive power on demand and produces continuous hydraulic power without need for intermediate electric motors. The last word in simplicity, this new "power package" eliminates contactor failure, minimizes maintenance, assures maximum operating economy for electric trucks up to 200,000 lb. capacities. Write for complete information.

SEE READY-POWER ON DISPLAY
AT THE MATERIAL HANDLING EXPOSITION
JUNE 9-12, BOOTH 1134

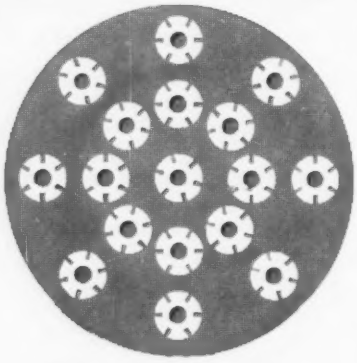
READY-POWER

The READY-POWER Co., 3822 GRAND RIVER AVE., DETROIT 8, MICH.

Better strip products



from the start with



continuous-cast

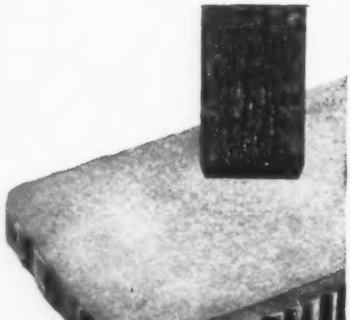
Flexograin phosphor bronze

Uniform, fine-grain Riverside phosphor bronze—Flexograin—is made even better through Riverside's *exclusive* continuous-casting process.

Riverside continuous casting eliminates porosity and assures a dense, homogeneous material that responds more readily to forming and develops uniformly high fatigue properties not attainable with ordinary phosphor bronze.

And Flexograin, being of a naturally finer grain structure, maintains the ductility and smoothness of finish that are unattainable with ordinary phosphor bronze strip.

Send for free Technical Bulletin describing Flexograin and its advantages in your production.
Write to *Riverside-Alloy Metal Division, H.K.Porter Company, Inc., Riverside, N.J.*



Good riddance to "Swiss Cheese" castings! Riverside continuous-cast, dense bronze offers time savings through faster fabrication in addition to improved product quality!

RIVERSIDE-ALLOY **PORTER** ***METAL DIVISION***

H.K.PORTER COMPANY, INC.

PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; Copper and Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepcoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD.

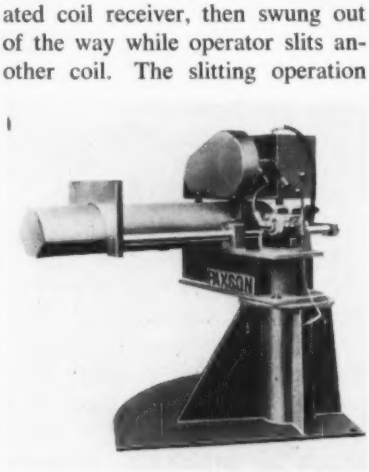
NEW EQUIPMENT

er slides have graduated swivels and may be turned through full 360°, individually or together and at any angle with each other. Work surface is 4 x 8⅞ in., and maximum travel is 4 in. for either slide. (South Bend Lathe Works.)

For more data circle No. 88 on postcard, p. 153

Slitting Coil Receiver

Slitting productivity is increased by a coil receiver. Instead of being banded on the slitter reel, coils are pushed on the hydraulically operated coil receiver, then swung out of the way while operator slits another coil. The slitting operation

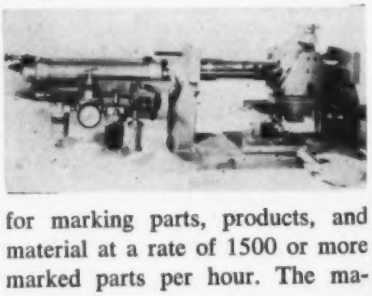


continues while the slit coils are banded on the coil receiver. Available in sizes designed to accommodate the strip from any plant's recoiler, this equipment has boosted production where used, especially when used with an upender of the same manufacture. (Paxson Machine Co.)

For more data circle No. 89 on postcard, p. 153

Rotary Marker

A rotary marking machine is available with 14-in. stroke, air-operated from standard air line,



for marking parts, products, and material at a rate of 1500 or more marked parts per hour. The ma-

chine uses flat dies with raised lettering to mark cylindrical products, which rotate on a mandrel as the die passes over them. A 4-in. diam part can be marked completely around its circumference, a 6-in. diam part, ⅔ of the way. Serial numbering and fixed marking can be done in alternate rotations. A precise gear-and-rack arrangement provides exact control of length of mark. (The Acromark Co.)

For more data circle No. 90 on postcard, p. 153

Flat Polisher

A small flat polisher is designed to grind, polish, and deburr flat surfaces of material with cross-sections to 12 x 4 in. It will handle coil, sheets, bars, blanks, and manufactured or cast parts, using an abrasive belt for either wet or dry operation. Belt tension and oscillating idler roll pressure are held constant by automatic air control. Controls provide for quick, easy adjustments and fast belt changes. (Murray-Way Corp.)

For more data insert No. 91 on postcard, p. 153

Surface Grinder

Designed for high-speed grinding and large crossfeed capacity at low cost, a hydraulic model is announced of a precision surface grinder previously available as a hand-feed model only. It features 14-in. capacity under full 12-in. diam grinding wheel, table speeds to 70 fpm, crossfeed from 0.005 to 0.250 in. with rapid traverse for dressing the wheel from the chuck or quick-positioning the work. (Covel Mfg. Co.)

For more data insert No. 92 on postcard, p. 153

CLEPO COMPOUNDS and PROCESSES for the METAL FINISHING PLANT

ALUMINUM FINISHING
SAT-N-ETCH Process for quality finishing
TETRA-DIP Process for pre-spot welding treatment
ALCORITE—for pre-paint treatment

BARREL FINISHING MATERIAL & PROCESSES
SPEE-D-BURR—for fine finishing
BURR-EENS—one of the fastest cutting mediums
DEBURRING Compounds & BURNISHING Compounds

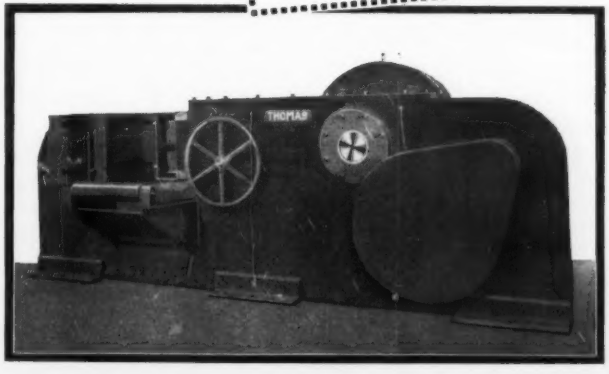
CLEANERS
Soak—high emulsifying
Electro—detergency plus conductivity
Washing Machine—low foaming
Cold Solvent—non inflammable
Emulsion—cleaning plus rust prevention

These and many other items are backed by a quarter of a century of study, research and service to the Plating and Finishing Industry. We specialize in serving the metal field. Because this field demands the best our products have to be the best. They are.

SPECIALTIES (to name a few)
CLEPO-PHOS cleans and coats steel before painting
DUXBAK'S for rust prevention
CLEPO 170 for tarnish prevention

FREDERICK GUMM Chemical Company Inc.
538 FOREST STREET, KEARNY, N. J.

The trend is to Thomas
FOR Cold BENDING AND STRAIGHTENING
Bars, Billets, Structurals, Rails, etc.



Write for Bulletin 315

The Thomas all-steel Bending and Straightening Machine is built in six sizes, varying from 50 to 400 tons. It does the job quickly and efficiently either *before* or *after* fabricating.

• *Rams are quickly and easily adjustable by means of convenient handwheel so located that operator has unobstructed view of work.*

THOMAS MACHINE MANUFACTURING CO.
PITTSBURGH 23, PA.
64

As the strike deadline nears what can you count on from Ryerson?

As this is written we can only hope, as everyone does, that a steel strike can be averted. However, if there is a strike here's the assurance we can give you of cooperation from Ryerson.

Long before the current heavy demand developed, Ryerson began building up inventories to meet any eventuality. So we entered the second quarter with stocks at an all-time high—by far the nation's largest in tonnage, types and sizes.

Although demand has been exceptionally high we are currently able to meet most requirements and expect to reach mid-year with much larger stocks than we have ever had in any comparable period. So, with few exceptions, we should still be able to take care of your needs.

Naturally, if steel is not being produced our stocks will not last indefinitely, but it's still a safe bet that you will be able to get what you need at Ryerson—if you can get it anywhere. You can also count on Ryerson to maintain its regular policy of fair published prices and to furnish steel that is always of high, uniform quality.

Your Ryerson representative is well qualified to review the facts and help you get the maximum for your steel-buying dollars. Ask him to analyze your requirements with you the next time he calls.

STEELS IN STOCK

CARBON STEEL BARS
Hot rolled and cold finished

STRUCTURALS
Channels, angles, beams, etc.

PLATES
Forming and welding, flange and firebox qualities, high carbon, E-Z-Cut, etc.

SHEETS & STRIP
More than 20 types

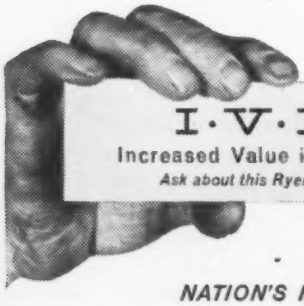
TUBING
Seamless and welded mechanical, hydraulic cylinder and fluid line, structural, etc.

STAINLESS STEEL
Sheets, plates, bars, tubing, pipe and fittings. 15 types, standard and aircraft qualities.

ALLOY STEEL
Case hardening, direct hardening and heat treated, Rycut leaded alloys, aircraft quality alloys, etc.

CONSTRUCTION STEELS
Re-bars and accessories, spirals, wire fabric, open web joists, etc.

TOOL STEEL
Water and oil hardening.



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The Iron Age Summary

Can McDonald Be a "Statesman"?

The odds still favor a steel strike, but there's always the chance steel labor might decide to be "reasonable."

This would be a switch for David J. McDonald, steel labor chief, but don't discount it entirely.

▪ Although the odds still favor a steel strike on June 30, a "statesmanlike" move by steel labor to avoid a walkout can not be entirely discounted.

On the basis of what has happened so far, all signs point to a steel strike. There has been no sign of "give" by either side. Still, "statesmanship" on the part of David J. McDonald, steel labor chief, should not be completely ruled out.

It's a Question—So far, all the cards appear to be stacked against his efforts to get the kind of new contract he wants. Whether he will upset the usual labor pattern by agreeing to a wage freeze until next year (an election year) remains to be seen. But it's a possibility.

However, before Mr. McDonald could seriously consider this he would have to be certain of support among his own rank-and-file as well as the high command of organized labor.

No Easy Decision — Mr. McDonald is no infant at the labor game. When he makes up his mind soon what to do—assuming he can't crack the solid steel management front—he will be doing it with his eyes wide open.

He is well aware that his men can love him in June and be ready to throw him overboard in January. But there is no question that he would be a national hero with the public and the White House if he stood still for a wage freeze. Just what he would be at the AFL-CIO headquarters in Washington would be another question. The old pros in the labor hierarchy probably would not take too kindly to "statesmanship" because of the effect it would have on contract negotiations in other industries.

Deferred Payment—At the same time, there is still another angle to consider:

If Mr. McDonald agrees to a wage freeze or to an inconsequential increase this year, he will exact a price for it next year. This is something that steel users and producers can be certain of.

Cheer and Problems—Meanwhile, the strength of steel demand has generated both cheer and problems for the mills. In some areas, producers have fallen behind on delivery promises. The situation seems to be worst in the Midwest. Still, no one is being hurt.

Furnace repair problems and mill breakdowns are creating headaches and putting a damper on output. Because of this, actual production at several big mills has fallen short of forecasts. These problems are a natural result of the strain imposed on furnaces and rolling mills during a time of peak operations.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	2,661	2,674	2,646	1,685
Ingot Index				
(1947-1949=100)	165.7	166.6	164.7	104.9
Operating Rates				
Chicago	94.0	94.0	95.0	69.0
Pittsburgh	96.0	94.5*	94.5	59.0
Philadelphia	96.0	95.0*	97.0	63.5
Valley	89.0	86.5*	90.5	40.0
West	96.0	95.0*	93.0	76.0
Cleveland	95.0	92.0*	97.0	36.0
Detroit	95.0	98.0	97.0	66.0
Buffalo	107.0	107.0	105.0	54.0
South Ohio River	95.0	93.0	90.0	61.0
South	97.0	95.0	91.5	67.0
Upper Ohio River	93.0	91.0*	98.0	78.0
St. Louis	95.0	97.0*	77.0	97.0
Aggregate	94.0	94.5	93.5	62.4

*Revised

Prices At a Glance

(Cents per lb unless otherwise noted)	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	6.196	6.196	6.196	5.967
Pig Iron (gross ton)	$66.41	$66.41	$66.41	$66.49
Scrap No. 1 hvy (Gross ton)	$37.17	$35.83	$33.83	$36.00
No. 2 bundles	$25.17	$24.17	$22.83	$26.83
Nonferrous				
Aluminum ingot	26.80	26.80	26.80	26.10
Copper, electrolytic	31.50	31.50	31.50	25.00
Lead, St. Louis	11.80	11.80	11.30	11.30
Magnesium	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin, Straits, N. Y.	104.00	103.50*	102.625	94.50
Zinc, E. St. Louis	11.00	11.00	11.00	10.00

Steel Foundry Sales Build Steam

With bookings at good levels, steel castings shipments this year could approach 1.6 million tons, best mark since 1957.

Founders are getting away from bulk commodity products and emphasizing engineered components, instead.

▪ Steel foundry sales are well on the way to a strong comeback from the low point of July 1958. Shipments this year could reach 1.6 million tons (see chart), giving founders their best year since 1957.

Bookings Better—Bookings for April were 64 pct of maximum demand compared to 23.2 pct last July. The "maximum demand" yardstick being used by the Steel Founders is the average of the best consecutive six months at each foundry since World War II.

Peak year of demand was 1956 at 78 pct followed by 61 pct in 1957 and 37 pct last year, lowest since World War II. So far this year they have been 66.4 pct for January, 61.4 pct for February and a high of 69.5 pct for March.

Buyer Rollcall—Most active class of customers are roadbuilding and construction equipment makers, farm equipment manufacturers and railroads. Heavy machinery is expected to pick up before long but oil field equipment will probably continue to lag.

Dated Yardstick — Selling steel castings by weight as a bulk commodity is going out of date, foundry experts believe. With new advances in metallurgy, heat treating and inspection, steel foundries are pushing their product into the realm of engineered components.

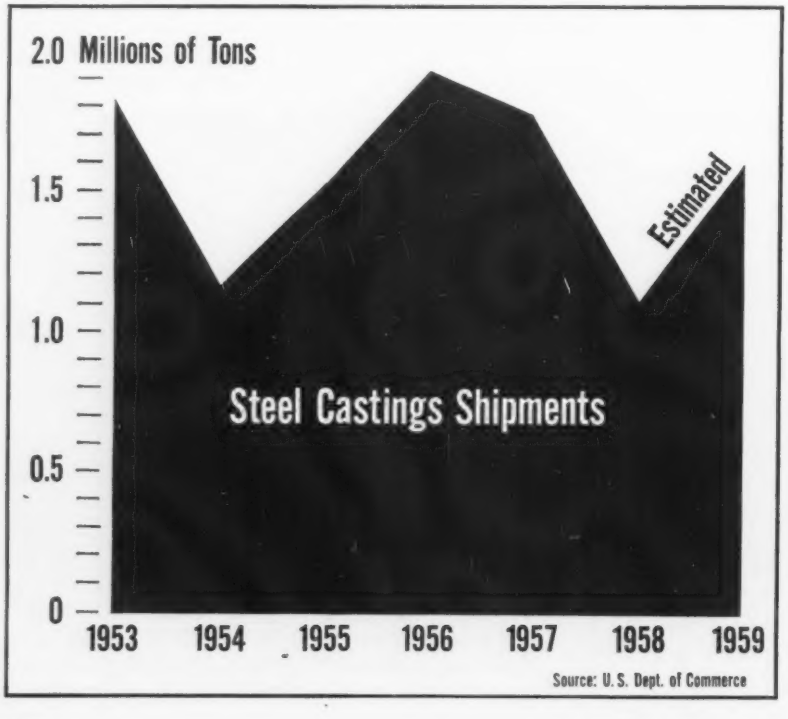
Industry leaders are putting into use improved designs to get the most out of a given weight of material. It has progressed to the point where some feel the traditional "tonnage shipped" yardstick is losing validity as a business indicator.

Product Trends — "Our industry is entering a new era where we are making use of properties seldom considered before," says F. Kermit Donaldson, executive secretary of the Steel Founders Society of America, Cleveland.

"We are now getting into cast steels in the 300,000 psi class. High stress cast fittings are being used in aircraft. Tool steel is being cast into parts. Steel valves must function red hot at 1400° in atomic power installations and some missile uses. Oil fields and refineries need higher pressure and temperature steel valves. Corrosion properties are getting new attention for chemical plants.

Waiting for Call — "Most steel foundrymen can do a first rate casting design, but seldom get the chance. One of our biggest jobs ahead is to get customers to let castings designers work with their product designers. Between them they can turn out an engineered component with no more weight or cost then necessary," says Mr. Donaldson. "Purchasing agents also ought to continually review parts being turned out at their plants with a view toward a better or more economical conversion."

Castings Shipments Rebound



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Mills Cautious About 3rd Quarter Orders

Steelmakers are checking over third quarter orders before accepting them.

Reason: Facing second quarter backlogs and strong post-June demand for steel, they want to avoid over-booking.

▪ Steel mills are giving third quarter orders a careful check before accepting them.

Reason for the caution: The strong post-June demand for steel coupled with present second quarter backlogs.

Most mills have not put buyers on a definite quota system. But they are being "selective" in booking orders. Requests for "excessive" or "abnormal" tonnages are getting turned down.

"We've been looking at every order closely," says one sales official. "And we're not taking anything that's out of line with past buying patterns."

Greatest third quarter interest centers on galvanized sheet, plate, wide flange beams, and hot- and cold-rolled sheet.

Meanwhile customers keep pushing for June deliveries as the second quarter wanes. Disappointments are sure for many with mill backlogs still mounting.

Some Midwest plate mills, for example, will probably still be rolling May tonnage the end of this month. Deliveries are most extended on sheet, plate, and wide flange beams. Bar shipments are a little better. Eastern producers are in good shape. But some Chicago mills are 3 weeks behind schedule.

Sheet and Strip — Galvanized, cold-rolled and hot-rolled sheets are among the strongest products for the third quarter. Some mills are limiting acceptance of orders. Any tonnage requests not following the buyer's previous tonnage patterns get close scrutiny.

Carryovers on second quarter orders at **East Coast** and **Pittsburgh** mills average about two weeks. But at **Chicago** mill backlogs run as high as 8 weeks. Sheet mills there are encountering a new difficulty: A shortage of semi-finished stock for rolling. Where mill rolling capacity exceeds hot metal capacity operations must now be adjusted to the available metal supply.

Some **Midwestern** steel users are so desperate for sheet they are asking warehouses to fill mill-sized orders of 80,000-100,000 lb.

Plate—Mill delivery delays are causing buyer headaches. In many cases users have not been able to build inventories as expected. And plate use is also rising. Along the **East Coast** carryovers are not extensive, averaging about 1-2 weeks. Mills there were "selective" on July bookings. Most have filled in all the tonnage they wanted to book. Those certain to operate beyond June hope to use July to clean up any backlogs.

Pittsburgh plate mills are reported just about current on orders. Third quarter bookings are coming in strongly. At **Chicago,** however, producers are from four to eight weeks in arrears on plate shipments. Warehouse stocks of plate are dwindling. Foreign plate prices are rising with many overseas mills already sold out on third quarter tonnages. Local mills are also booked solid for the July-September period on both light and heavy plate.

Structurals—Mill backlogs are increasing on second quarter orders. Shipping delays are ham-stringing fabricators. In some cases jobs are being held up, pending arrival of steel. The fabricators, and others, are booking structurals heavily for third quarter delivery. At **Chicago** wide flange beams are in greater demand than any other product for July-September delivery.

Bar—July orders for hot-rolled bar are good at **Eastern** and **Pittsburgh** mills. Cold finished bars are in lesser demand. At **Chicago** some bar mills are running 3-4 weeks late on delivery. Warehouses there are now out of stock on some popular sizes of hot-rolled. And demand continues at high levels. Prospects are bar will shortly be one of the tightest products in the **Midwest.**

Pipe and Tubing—Both standard pipe and oil country seamless are sold out through the second quarter. But neither is in heavy demand beyond June. Any interruptions to seamless production by a steel strike, however, would probably quickly bring a reduction in oil field drilling operations.

Tinplate—July orders are listed as "fair." One large producer, Weirton, would not be affected by a general steel strike. Tinplate shipments this month should reduce mill stocks to the lowest mark in a long while. The mills hope transportation problems don't delay deliveries.

PURCHASING AGENT'S CHECKLIST

Instrument rental service set up by General Electric. P. 94

Automotive market for stainless steel products gets attention from Allegheny Ludlum. P. 105

Latest edition of IRON AGE Metal Cleaning and Finishing Handbook. Starts on P. 125

COMPARISON OF PRICES

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in **Heavy Type**; declines appear in *Italics*.

	June 2 1959	May 26 1959	May 5 1959	June 2 1958
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	4.925¢
Cold-rolled sheets	6.275	6.275	6.275	6.05
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.60
Hot-rolled strip	5.10	5.10	5.10	4.925
Cold-rolled strip	7.425	7.425	7.425	7.17
Plate	5.30	5.30	5.30	5.12
Plates, wrought iron	13.55	13.55	13.55	13.15
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.30
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.00
Special coated mfg. ternes	9.90	9.90	9.90	9.55
Bars and Shapes: (per pound)				
Merchant bar	5.675¢	5.675¢	5.675¢	5.425¢
Cold finished bar	7.65	7.65	7.65	7.30
Alloy bars	6.725	6.725	6.725	6.475
Structural shapes	5.50	5.50	5.50	5.275
Stainless bars (No. 302)	46.75	46.75	45.00	45.00
Wrought iron bars	14.90	14.90	14.90	14.45
Wire: (per pound)				
Bright wire	800¢	8.00¢	8.00¢	7.65¢
Rails: (per 100 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.525
Light rails	6.725	6.725	6.725	6.50
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$77.50
Slabs, rerolling	80.00	80.00	80.00	77.50
Forging billets	99.50	99.50	99.50	96.00
Alloys blooms, billits, slabs	119.00	119.00	119.00	114.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.15¢
Skelp	5.05	5.05	5.05	4.875
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	5.967¢

(Effective June 2, 1959)

	June 2 1959	May 26 1959	May 5 1959	June 2 1958
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.57	$70.57	$70.57	$70.97
Foundry, Southern Cin'ti	73.87	73.87	73.87	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.07	70.07	70.07	70.47
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb‡	12.25	12.25	12.25	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.41	$66.41	$66.41	$66.49
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$41.50	$39.50	$35.50	$37.50
No. 1 steel, Phila. area	35.50	35.50	33.50	34.00
No. 1 steel, Chicago	34.50	32.50	32.50	36.50
No. 1 bundles, Detroit	35.50	31.50	29.50	28.50
Low phos., Youngstown	41.50	40.00	38.50	37.50
No. 1 mach'y cast, Pittsburgh	49.50	49.50	49.50	48.50
No. 1 mach'y cast, Phila.	49.50	49.50	49.50	47.50
No. 1 mach'y cast, Chicago	57.50	55.50	52.50	47.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$37.17	$35.83	$33.83	$36.00
No. 2 bundles	25.17	24.17	22.83	26.83
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.50-15.50	$14.50-15.50	$14.50-15.50	$15.38
Foundry coke, prompt	18.50	18.50	18.50	17.50-19
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	31.50	31.50	31.50	25.00
Copper, Lake, Conn.	31.50	31.50	31.50	25.00
Tin, Straits, N. Y.	104.00†	103.50*	102.625	94.50
Zinc, East St. Louis	11.00	11.00	11.00	10.00
Lead, St. Louis	11.80	11.80	11.30	11.30
Aluminum, virgin ingot	26.80	26.80	26.80	26.10
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composites

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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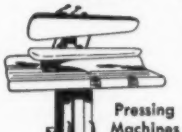
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Sellers Have Edge As Prices Rise

Scrap market activity has picked up sharply in the past week.

Higher bids for industrial lists and new export buying puts strength in dealer prices.

■ After months of buyer dominance, the balance in the scrap market is shifting in favor of the seller.

Prices in many areas are higher this week as dealers and industrial scrap generators successfully hold out for better offers from the mills.

In Pittsburgh, Chicago, and Detroit, industrial lists closed from $2 to $4 higher. Brisk export activity continues to drain good scrap from the port districts, adding pressure to domestic prices.

But how long sellers will have the upper hand is a question. If a strike is called in the steel industry on June 30, the struck mills may sharply curtail their scrap purchases. On the other hand, in previous strike years many mills continued to buy scrap and stored it in dealer yards until the strike was over. In view of third and fourth quarter business optimism, the mills may resort to this policy again if a strike comes off.

Based on increases in Pittsburgh and Chicago, The IRON AGE No. 1 heavy melting Composite Price rose $1.34 to $37.17.

Pittsburgh—Prices of most grades jumped again this week as industrial lists went for $3-$4 over last month and orders in nearby districts raised the price wall around Pittsburgh. A local mill reportedly reached out for a large portion of industrial tonnage. There is little new activity in the dealer market and most old orders will run out by June 20. However, the idea of a strong future market has taken hold. Yards are buying scrap on the basis of No. 1 heavy melting price of $45. No. 2 bundles are scarce as low prices and mill preference for bundles has drained yards.

Chicago—Broker reluctance to sell and continued broker buying to cover old orders, forced scrap prices upward. Factory bundles moved to mills on new orders at $2 higher. While several mills withdrew from the market, purchases by smaller mills confirmed the stronger tone of the market. Cast continues strong, with foundry buying volume still gaining. Shipments to eastern mills appear to be increasing.

Philadelphia—Prices are firmer as the balance shifts from a buyer's to a seller's market. No. 1 heavy melting price is unchanged but other primary and secondary openhearth grades are up $1 on limited mill buying. Export is draining good scrap from the district. A small quantity of turnings was sold at quoted prices.

New York—Strengthening of export buying has firmed prices, although domestic buying is virtually nil. Clean cast chemical borings are down $2. Other prices are unchanged.

Detroit—An expected spurt in industrial scrap prices turned into a full-fledged gallop by the time the last industrial list closed. No. 1 factory bundles brought more than $39 on late lists, $2 higher than early closers. One major automaker withdrew more than 14,000 tons of prime scrap from the lists in order to supply its own foundries.

Cleveland — Dealer grades continued up another $1 in sympathy with late auto lists and scattered buys. There is little real market strength, however. Most of it is a flurry of pre-strike buying. Mills are taking only top grade material to avoid risking loss of a heat.

St. Louis—Increased mill buying added strength to the market here. No. 1 dealer bundles advanced $2 and No. 2 bundles $1. Cupola cast is up $2, while stove plate and rails, 18 in. and under, rose $1.

Birmingham—Most scrap items are showing strength, possibly because of dealer resistance to low prices. Cast continues firm. But some foundries are reported buying foreign pig iron at well below the domestic price.

Cincinnati — Mills raised prices to quoted levels. Dealers had expected more and are not anxious to sell. Local production lists went for about $39 on cars and are destined for up-river mills.

Buffalo—Prices of No. 1 and No. 2 items are up $2 on sales to a local mill. Low phos is also up $2 and turnings prices increased $1.

Boston—Prices of primary openhearth grades are up $2, due mostly to strength in other districts. Machine shop turnings are up $1. Chemical borings dropped $2 on a sale. On the whole, there is a better sentiment in this market.

West Coast—Larger - than - expected third quarter export orders have strengthened this market, although prices are unchanged. Cast prices are firm.

Houston—The market is slow, although it appears balanced. Exporters are hopeful of increased activity. The district mill is receiving shipments on orders which it placed for delivery through June 15.

SCRAP PRICES *(Effective June 2, 1959)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$41.00 to $42.00
No. 2 hvy. melting	32.00 to 33.00
No. 1 dealer bundles	42.00 to 43.00
No. 1 factory bundles	46.00 to 47.00
No. 2 bundles	28.00 to 29.00
No. 1 busheling	41.00 to 42.00
Machine shop turn.	20.00 to 21.00
Shoveling turnings	27.00 to 28.00
Cast iron borings	26.00 to 27.00
Low phos. punch'gs plate	46.00 to 47.00
Heavy turnings	33.00 to 34.00
No. 1 RR hvy. melting	43.00 to 44.00
Scrap rails, random lgth.	50.00 to 51.00
Rails 2 ft and under	55.00 to 56.00
RR specialties	48.00 to 49.00
No. 1 machinery cast.	49.00 to 50.00
Cupola cast.	43.00 to 44.00
Heavy breakable cast.	41.00 to 42.00
Stainless	
18-8 bundles and solids	230.00 to 235.00
18-8 turnings	115.00 to 120.00
430 bundles and solids	130.00 to 135.00
410 turnings	55.00 to 60.00

Chicago

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	32.00 to 33.00
No. 1 dealer bundles	35.00 to 36.00
No. 1 factory bundles	41.00 to 42.00
No. 2 bundles	24.00 to 25.00
No. 1 busheling	34.00 to 35.00
Machine shop turn.	19.00 to 20.00
Mixed bor. and turn.	21.00 to 22.00
Shoveling turnings	21.00 to 22.00
Cast iron borings	21.00 to 22.00
Low phos. forge crops	48.00 to 49.00
Low phos. punch'gs plate, ¼ in. and heavier	44.00 to 45.00
Low phos. 2 ft and under	42.00 to 43.00
No. 1 RR hvy. melting	39.00 to 40.00
Scrap rails, random lgth.	46.00 to 47.00
Rerolling rails	57.00 to 58.00
Rails 2 ft and under	53.00 to 54.00
Angles and splice bars	49.00 to 50.00
RR steel car axles	64.00 to 65.00
RR couplers and knuckles	47.00 to 48.00
No. 1 machinery cast.	57.00 to 58.00
Cupola cast.	50.00 to 51.00
Cast iron wheels	42.00 to 43.00
Malleable	58.00 to 59.00
Stove plate	48.00 to 49.00
Steel car wheels	46.00 to 47.00
Stainless	
18-8 bundles and solids	210.00 to 215.00
18-8 turnings	110.00 to 115.00
430 bundles and solids	115.00 to 120.00
430 turnings	55.00 to 60.00

Philadelphia Area

No. 1 hvy. melting	$35.00 to $36.00
No. 2 hvy. melting	28.00 to 30.00
No. 1 dealer bundles	36.00 to 38.00
No. 2 bundles	22.00 to 23.00
No. 1 busheling	35.00 to 37.00
Machine shop turn.	19.00 to 20.00
Mixed bor. short turn.	19.00 to 20.00
Cast iron borings	19.00 to 20.00
Shoveling turnings	23.00 to 24.00
Clean cast. chem. borings	24.00 to 25.00
Low phos. 5 ft and under	37.00 to 40.00
Low phos. 2 ft punch'gs	39.00 to 42.00
Elec. furnace bundles	38.00 to 39.00
Heavy turnings	32.00 to 33.00
RR specialties	42.00 to 43.00
Rails 18 in. and under	58.00 to 60.00
Cupola cast.	40.00 to 41.00
Heavy breakable cast.	41.00 to 42.00
Cast iron car wheels	44.00 to 45.00
Malleable	67.00 to 68.00
No. 1 machinery cast.	49.00 to 50.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.50 to $33.50
No. 2 hvy. melting	27.50 to 28.50
No. 1 dealer bundles	32.50 to 33.50
No. 2 bundles	21.00 to 22.00
Machine shop turn.	14.00 to 15.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	16.00 to 17.00
Low phos. 18 in. and under	41.00 to 42.00
Rails, random length	46.00 to 47.00
Rails, 18 in. and under	53.00 to 54.00
No. 1 cupola cast.	45.00 to 46.00
Hvy. breakable cast.	40.00 to 41.00
Drop broken cast.	49.00 to 50.00

Youngstown

No. 1 hvy. melting	$38.50 to $39.50
No. 2 hvy. melting	32.50 to 33.50
No. 1 dealer bundles	38.50 to 39.50
No. 2 bundles	27.50 to 28.50
Machine shop turn.	19.50 to 20.50
Shoveling turnings	24.50 to 25.50
Low phos. plate	41.00 to 42.00

Cleveland

No. 1 hvy. melting	$35.00 to $36.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	35.00 to 36.00
No. 1 factory bundles	41.50 to 42.50
No. 2 bundles	24.00 to 25.00
No. 1 busheling	35.00 to 36.00
Machine shop turn.	16.00 to 17.00
Mixed bor. and turn.	21.00 to 22.00
Shoveling turnings	21.00 to 22.00
Cast iron borings	21.00 to 22.00
Cut structural & plates, 2 ft & under	42.00 to 43.00
Drop forge flashings	35.00 to 36.00
Low phos. punch'gs plate	36.00 to 37.00
Foundry steel, 2 ft & under	37.00 to 38.00
No. 1 RR hvy. melting	39.00 to 40.00
Rails 2 ft and under	55.00 to 56.00
Rails 18 in. and under	56.00 to 57.00
Steel axle turnings	24.00 to 25.00
Railroad cast.	53.00 to 54.00
No. 1 machinery cast.	51.00 to 52.00
Stove plate	48.00 to 49.00
Malleable	66.00 to 67.00
Stainless	
18-8 bundles	215.00 to 225.00
18-8 turnings	115.00 to 120.00
430 bundles	120.00 to 125.00

Buffalo

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	28.00 to 29.00
No. 1 busheling	33.00 to 34.00
No. 1 dealer bundles	33.00 to 34.00
No. 2 bundles	24.00 to 25.00
Machine shop turn.	16.00 to 17.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	17.00 to 18.00
Low phos. plate	40.00 to 41.00
Structurals and plate, 2 ft and under	41.00 to 42.00
Scrap rails, random lgth.	39.00 to 40.00
Rails 2 ft and under	49.00 to 50.00
No. 1 machinery cast.	48.00 to 49.00
No. 1 cupola cast.	44.00 to 45.00

St. Louis

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	31.00 to 32.00
No. 1 dealer bundles	39.00 to 40.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	12.00 to 13.00
Shoveling turnings	14.00 to 15.00
Cast iron borings	18.00 to 19.00
No. 1 RR hvy. melting	38.00 to 39.00
Rails, random lengths	43.00 to 44.00
Rails, 18 in. and under	50.00 to 51.00
Angles and splice bars	44.00 to 45.00
RR specialties	43.00 to 44.00
Cupola cast.	50.00 to 51.00
Heavy breakable cast.	40.00 to 41.00
Cast iron brake shoes	38.50 to 39.50
Stove plate	44.00 to 45.00
Cast iron car wheels	40.00 to 41.00
Rerolling rails	54.00 to 55.00
Unstripped motor blocks	41.00 to 42.00

Birmingham

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	29.00 to 30.00
Machine shop turn.	22.00 to 23.00
Shoveling turnings	24.00 to 25.0
Cast iron borings	14.00 to 15.00
Electric furnace bundles	36.00 to 37.00
Elec. furnace, 3 ft & under	34.00 to 35.00
Bar crops and plate	40.00 to 41.00
Structural and plate, 2 ft.	39.00 to 40.00
No. 1 RR hvy. melting	33.00 to 34.00
Scrap rails, random lgth.	39.00 to 40.00
Rails, 18 in. and under	44.00 to 45.00
Angles and splice bars	42.00 to 43.00
Rerolling rails	52.00 to 53.00
No. 1 cupola cast.	53.00 to 54.00
Stove plate	53.00 to 54.00
Cast iron car wheels	39.00 to 40.00
Unstripped motor blocks	40.00 to 41.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	21.00 to 22.00
No. 2 dealer bundles	15.00 to 16.00
Machine shop turnings	9.00 to 10.00
Mixed bor. and turn.	11.00 to 12.00
Shoveling turnings	13.00 to 14.00
Clean chem. cast. borings	18.00 to 20.00
No. 1 machinery cast.	37.00 to 38.00
Mixed yard cast.	35.00 to 36.00
Heavy breakable cast.	33.00 to 34.00
Stainless	
18-8 prepared solids	195.00 to 200.00
18-8 turnings	85.00 to 90.00
430 prepared solids	85.00 to 90.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	19.50 to 20.50
No. 1 busheling	33.00 to 34.00
Drop forge flashings	32.00 to 33.00
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	14.00 to 15.00
Shoveling turnings	15.00 to 16.00
Cast iron borings	14.00 to 15.00
Heavy breakable cast.	34.00 to 35.00
Mixed cupola cast.	43.00 to 44.00
Automotive cast.	50.00 to 51.00
Stainless	
18-8 bundles and solids	210.00 to 215.00
18-8 turnings	100.00 to 105.00
430 bundles and solids	100.00 to 105.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	20.00 to 21.00
No. 1 dealer bundles	26.00 to 27.00
No. 2 bundles	12.00 to 13.00
No. 1 busheling	26.00 to 27.00
Machine shop turn.	7.00 to 8.00
Shoveling turnings	11.00 to 12.00
Clean cast. chem. borings	14.00 to 15.00
No. 1 machinery cast.	33.00 to 34.00
Mixed cupola cast.	33.00 to 34.00
Heavy breakable cast.	31.00 to 32.00
Stove plate	29.00 to 30.00

San Francisco

No. 1 hvy. melting	$36.00
No. 2 hvy. melting	33.00
No. 1 dealer bundles	33.00
No. 2 bundles	22.00
Machine shop turn.	17.00
Cast iron borings	17.00
No. 1 cupola cast.	45.00

Los Angeles

No. 1 hvy. melting	$38.00
No. 2 hvy. melting	36.00
No. 1 dealer bundles	35.00
No. 2 bundles	18.00
Machine shop turn.	$16.00 to 17.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	18.00 to 19.00
Elec. furn. 1 ft and under (foundry)	49.00
No. 1 cupola cast.	45.00

Seattle

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	33.00
No. 2 bundles	22.00
No. 1 cupola cast.	36.00
Mixed yard cast.	36.00

Hamilton, Ont.

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.25
No. 2 hvy. melting	28.25
No. 1 dealer bundles	32.25
No. 2 bundles	22.75
Mixed steel scrap	24.25
Bush., new fact., prep'd	32.25
Bush., new fact., unprep'd	26.25
Machine shop turn.	14.00
Shortsteel turn.	17.00
Mixed bor. and turn.	13.00
Rails, rerolling	37.00
Cast scrap	$46.50 to 48.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$34.00
No. 2 hvy. melting	31.00
No. 2 bundles	20.00
Machine shop turn.	16.00
Shoveling turnings	20.00
Cut structural plate 2 ft & under	$44.00 to 45.00
Unstripped motor blocks	37.00 to 38.00
Cupola cast.	44.00 to 45.00
Heavy breakable cast.	28.00 to 29.00

Why Nickel Market Looks Firm

Russia is buying again, and paying a premium to get metal in a hurry.

And consumer inventories are apparently pared as far as they are going to be.

▪ While the trade has been paying close attention to the pulse rate of most other major nonferrous metals, nickel has been quietly taking off.

International Nickel, producer of about 60 pct of the entire Free World supply, says only that "things are moving along very nicely."

No One Is Hurting — Actually, there's just too much capacity—existing and coming in—for any real bind to develop. But the signs of firming are now too obvious to be ignored.

For one thing Russia is back in the world market again. The latest report is that the USSR bought three million lb of nickel from a French seller for 80¢ per lb. This is a 6¢ premium over the going price of 74¢ per lb.

Free World observers note this is probably not a part of the Reds' economic offensive because (1) more metal is involved than is traditional in this type of deal, and (2) there is no apparent political or cold war gain to Russia. The feeling is Russia must really need the nickel.

But why pay a premium when there is apparently an excess of supply over demand? The consensus among international metal traders is that while there may be more than enough nickel to go around overall, the market has firmed to where it now requires a premium to get a large quantity of metal together in a hurry.

Another signpost: In April International Nickel bought 4,119,000 lb of nickel oxide sinter from the government-owned plant at Nicaro, Cuba. General Services Administration says both purchase and delivery were completed that month.

Demand Is Up—With deliveries down noticeably last year, and new capacity coming in, the trade had generally assumed Inco had more than enough capacity to meet even spot surges.

One reason may be that Inco was idle for the last three months of 1958 due to a strike. During the shutdown there was no real cramp in Inco's delivery. It now seems that the company may have pretty well stripped its unsold stocks, and demand has been building too fast to get them rebuilt.

Another reason: "Because of heavy inventory liquidation by consumers, nickel deliveries were substantially lower (in 1958) than actual consumption," says Inco chairman John F. Thompson. Apparently the difference is now starting to show up.

Aluminum

A note from a representative of one of the Big 3 U. S. producers:

"April's production may have been down slightly, but I believe the daily rate was up. (There were fewer working days in April than in March.) For us, the daily rate has increased each month for nearly a year, with one minor exception."

The Aluminum Assn. reports sheet, plate and foil shipments in April topped March. The 17,182,000 lb of heat-treatable sheet and plate moved in April was off from the 21,726,000 lb shipped the previous month. But the 118,347,000 lb of non-heat-treatable shipped, compared to 107,565,000 lb in March, more than made up the difference.

Box score for unused capacity of the major U. S. producers: Alcoa—143,000 tons; Kaiser—85,330 tons; Reynolds—42,000 tons. There is more and more speculation in the trade that even without these idle pots some basic metal is now being stocked up by producers.

Tin prices for the week: May 27—103.50; May 28—103.50; May 29—103.50; June 1—103.50; June 2—104.00.*

* Estimate.

Monthly Average Metal Prices

(Cents per lb except as noted)

Average prices of the major nonferrous metals in APRIL based on quotations appearing in THE IRON AGE, were as follows:

Electrolytic copper, del'd Conn. Valley	31.50
Copper, Lake	31.50
Straits Tin, New York	103.065
Zinc, E. St. Louis	11.00
Lead, St. Louis	11.70
Aluminum ingot	26.80

Note: Quotations are on going prices

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum pig	24.70	24.00	8/1/58
Aluminum ingot	26.80	26.10	8/1/58
Copper (E)	31.50	30.00	3/9/59
Copper (CS)	32.00	32.50	4/30/59
Copper (L)	31.50	30.00	3/9/59
Lead, St. L.	11.80	11.30	5/7/59
Lead, N. Y.	12.00	11.50	5/7/59
Magnesium ingot	36.00	34.50	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/8/58
Titanium sponge	162-182	185-205	11/3/58
Zinc, E. St. L.	11.00	11.50	2/25/59
Zinc, N. Y.	11.50	12.00	2/25/59

ALUMINUM: 99% ingot frt allwd. COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. TIN: See above; Other primary prices, pg. 190.

NEW

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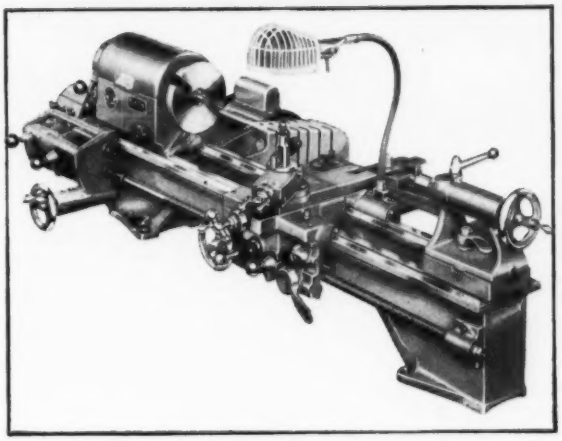

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NONFERROUS PRICES

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship pt., frt. allowed)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.032	.081	.136 .249	.250- 3.
1100, 3003	45.7	43.8	42.8	43.3
5052	53.1	48.4	46.9	46.0
6061-0	50.1	45.7	43.9	44.9

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6- 8	42.7-44.2	51.1-54.8
12-14	42.7-44.2	52.0-56.5
24-26	43.2-44.7	62.8-67.5
36-38	46.7-49.2	86.9-90.5

Screw Machine Stock—2011-T-3

Size"	⅛	⅜-⅝	¾-1	1¼-1½
Price	62.0	61.2	59.7	57.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 10,000 lb)

Length"→	72	96	120	144
.019 gage	$1.411	$1.884	$2.353	$2.823
.024 gage	1.762	2.349	2.937	3.524

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type→ Gage→	.250 3.00	.250- 2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	95.7	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	126	106	128
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	120	105	121
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	55.63	.....	52.86	55.82
Brass, Yellow	48.24	48.75	48.18	51.05
Brass, Low	51.23	51.77	51.17	54.54
Brass, R L	52.29	52.83	52.23	55.60
Brass, Naval	52.80	.....	46.61	56.21
Muntz Metal	50.85	.....	46.16	.....
Comm. Bz.	53.90	54.44	53.84	56.96
Mang. Bz.	56.54	.....	50.14	.....
Phos. Bz. 5%	75.34	.....	75.84	.....

Free Cutting Brass Rod 32.73

TITANIUM

(Base prices, f.o.b. mill)

Sheet and strip, commercially pure, $7.25-$8.50; alloy, $13.40-$17.00, Plate, HR, commercially pure, $5.25-$6.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.75-$6.25; alloy, $7.75-$10.00; Bar, HR or forged, commercially pure, $4.25-$5.00; alloy, $4.25-$7.50; billets, HR, commercially pure, $3.55-$4.10; alloy, $3.55-$5.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 29.50
Beryllium Aluminum 5% Be, Dollar per lb contained Be $74.75
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $71.50
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.30
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic basis... $ 1.31
Cobalt, 97-99% (per lb) .... $1.75 to $1.82
Germanium, per gm, f.o.b. Miami, Okla., refined ..... 35.00 to 42.00
Gold, U. S. Treas., per troy oz. $35.00
Indium, 99.9%, dollars per troy oz.. $ 2.25
Iridium, dollars per troy oz. ... $75 to $85
Lithium, 98% ..... $11.00 to $14.00
Magnesium, sticks, 100 to 500 lb.... 59.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $243 to $246
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz... $18 to $20
Platinum, dollars per troy oz... $77 to $80
Rhodium ..... $120.00 to $125.00
Silver ingots (¢ per troy oz.) 91.375
Thorium, per kg. $43.00
Vanadium ..... $ 3.45
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 30.25
- No. 120 ..... 29.00
- No. 123 ..... 28.00

80-10-10 ingot
- No. 305 ..... 34.50
- No. 315 ..... 32.50

88-10-2 ingot
- No. 210 ..... 43.50
- No. 215 ..... 39.25
- No. 245 ..... 35.00

Yellow ingot
- No. 405 ..... 24.75

Manganese bronze
- No. 421 ..... 27.75

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 24.75-25.00
- 0.60 copper max. 24.50-24.75

Piston alloys (No. 122 type)..24.25-25.25
No. 12 alum. (No. 2 grade)...21.50-22.00
108 alloy 22.00-22.50
195 alloy 25.00-26.00
13 alloy (0.60 copper max.)...24.25-24.75
AXS-679 (1 pct zinc) 21.75-22.25

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½% 22.50-23.50
Grade 2—92-95% 21.25-22.25
Grade 3—90-92% 20.25-21.25
Grade 4—85-90% 17.50-18.50

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	27½	26¾
Yellow brass	20⅝	18¾
Red brass	24¼	23½
Comm. bronze	25⅛	24⅜
Mang. bronze	19¼	18⅜
Free cutting rod ends.	20½	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	28¼
No. 2 copper wire	26¾
Light copper	24¾
*Refinery brass	26¼
Copper bearing material	25¾

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	28¼
No. 2 copper wire	26¾
Light copper	24¾
No. 1 composition	22
No. 1 comp. turnings	21½
Hvy. yellow brass solids	16
Brass pipe	16½
Radiators	17

Aluminum

Mixed old cast.	13½—14½
Mixed new clips	16 —17
Mixed turnings, dry	14 —15

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire	25½—26
No. 2 copper wire	23½—24
Light copper	21½—22
Auto radiators (unsweated)	14½—15
No. 1 composition	19 —19½
No. 1 composition turnings	17½—18
Cocks and faucets	15 —15½
Clean heavy yellow brass	13½—13¾
Brass pipe	15 —15½
New soft brass clippings	15¾—16¼
No. 1 brass rod turnings	13 —13½

Aluminum

Alum. pistons and struts	6 — 6½
Aluminum crankcase	9½—10
1100 (2s) aluminum clippings	13 —13½
Old sheet and utensils	9½—10
Borings and turnings	6 — 6½
Industrial castings	9½—10
2020 (24S) clippings	11 —11½

Zinc

New zinc clippings	4¾— 5¼
Old zinc	3¼— 3½
Zinc routings	2 — 2¼
Old die cast scrap	1¾— 2

Nickel and Monel

Pure nickel clippings	52-54
Clean nickel turnings	37-40
Nickel anodes	52-54
Nickel rod ends	52-54
New Monel clippings	30-32
Clean Monel turnings	30-32
Old sheet Monel	26-28
Nickel silver clippings, mixed	18
Nickel silver turnings, mixed	15

Lead

Soft scrap lead	7 — 7¼
Battery plates (dry)	2 — 2¼
Batteries, acid free	1⅞— 2⅛

Miscellanous

Block tin	77 —78
No. 1 pewter	59 —60
Auto babbitt	40 —41
Mixer common babbitt	9½—10
Solder joints	13¼—13¾
Siphon tops	42
Small foundry type	9½—10
Monotype	9½—10
Lino. and stereotype	8½— 9
Electrotype	7 — 7½
Hand picked type shells	5¼— 5¾
Lino. and stereo. dross	2¼— 2¾
Electro dross	2¼— 2¾

(Effective June 1, 1959)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PIL-ING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3, R3*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Bridgeport, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3,* $114.00 *T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1,P11*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3,B4* 7.525 *E3*			8.40 *S9*	15.55 *S9*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *F3*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*			6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

(Effective June 1, 1959)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* *1.25*-lb. base box	Electro** *0.25*-lb. base box	Holloware Enameling *29* ga.
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price, 0.75 lb./0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*			$10.50 *U1*	$9.20 *U1*	
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*			7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	
	Worcester, Mass.									6.70 *A5*			
	Trenton, N. J.												
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3,W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A1*	6.275 *A1*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3,Y1*	6.275 *U1, I3,Y1*	6.875 *U1, I3*	6.775 *U1, I3,Y1*	7.225 *U1*	7.525 *U1, Y1,I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1,Y1*	7.85 *U1, Y1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*	6.875 *G2*							$9.20 *G2*	7.95 *G2*
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1**, *R3*	7.525 *R3, S1*	9.275 *R3,*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Donora, Aliquippa, McKeesport, Pa.	5.10 *U1, J3,P6*	6.275 *U1, J3,P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3,P6*	$10.40 *W5, J3*	$9.10 *U1, J3*	7.85 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3,W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	7.85 *W5*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*	7.50 *J3**	6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2,R3*	$10.50 *T2*	$9.20 *T2*	
	Houston, Texas									6.65 *S2*			

*Electrogalvanized sheets.

(Effective June 1, 1959)

*7.425 at Sharon-Niles is 7.225

STEEL PRICES

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		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *C4*		7.50 *C4*	7.95 *C4*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.375 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Fairless, Pa.	5.825 *U1*	5.825 *U1*		6.875 *U1*							
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3* 6.475 *T5*	9.025 *R3,R2* 8.775 *T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8,B5* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5* 9.225 *B5,P3, P8*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*					5.30 *N4*				8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							5.30 *W5*				
	Youngstown, Ohio	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, S12*	8.625 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				8.675 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*				8.675 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.675 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective June 1, 1959) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C4 Claymont Products Dept., Claymont, Del.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B.. Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Steel Corp., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½ In.		3 In.		3½-4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50								
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50								
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Fontana *K1*	*6.25		*2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50								
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.
Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 11.00¢ per lb.

(Effective June 1, 1959)

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*L4, C4, A3, J2*) 10 pct	Plate (*L4, C4, A3, J2*) 15 pct	Plate (*L4, C4, A3, J2*) 20 pct	Sheet (*I2*) 20 pct
Stainless Type	302	.....	.....	.....	37.50
	304	28.80	31.55	34.30	40.00
	316	42.20	46.25	50.25	58.75
	321	34.50	37.75	41.05	47.25
	347	40.80	44.65	48.55	57.00
	405	24.60	26.90	29.25	.....
	410	22.70	24.85	27.00	.....
	430	23.45	25.65	27.90	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 43.15; 1 side, 36.20.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25	.....	.....	.....
Cleveland *R3*	.....	.....	.....	.....	.....	15.35
So. Chicago *R3*	.....	.....	.....	10.10	.....	.....
Ensley *T2*	5.75	6.725	.....	.....	.....	.....
Fairfield *T2*	.....	6.725	.....	10.10	6.875	.....
Gary *U1*	5.75	.....	.....	.....	6.875	.....
Ind. Harbor *I3*	.....	.....	.....	10.10	.....	.....
Johnstown *B3*	.....	6.725	.....	.....	.....	.....
Joliet *U1*	.....	.....	7.25	.....	.....	.....
Kansas City *S2*	.....	.....	.....	10.10	.....	15.35
Lackawanna *B3*	5.75	6.725	7.25	.....	6.875	.....
Lebanon *B3*	.....	.....	7.25	.....	.....	15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *P5*	.....	.....	.....	.....	.....	14.75
Pittsburgh *J3*	.....	.....	.....	10.10	.....	.....
Seattle *B2*	.....	.....	.....	.....	6.75	15.85
Steelton *B3*	5.75	.....	7.25	.....	6.875	.....
Struthers *Y1*	.....	.....	.....	10.10	.....	.....
Torrance *C7*	.....	.....	.....	.....	6.75	.....
Williamsport *S5*	.....	6.725	.....	.....	.....	.....
Youngstown *R3*	.....	.....	.....	10.10	.....	.....

COKE

	Net-Ton
Furnace, beehive (f.o.b.) Connellsville, Pa.	$14.50 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Detroit f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearney, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	34.35
Erie, Pa., f.o.b.	32.00
Cleveland, del'd	34.19
Cincinnati, del'd	32.84
St. Paul, f.o.b.	31.25
St. Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1959 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Cold-Reduced (Coiled or Cut Length) Fully Processed
Field	.....	9.875	
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor	.....	12.475	
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30	Grain Oriented	
Trans. 58	16.80	Trans. 80	19.70
Trans. 52	17.85	Trans. 73	20.20
		Trans. 66	20.70

Producing points: Aliquippa (*J3*); Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*S1*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE Diam. (In.)	GRAPHITE Length (In.)	GRAPHITE Price	CARBON* Diam. (In.)	CARBON* Length (In.)	CARBON* Price
24	84	27.25	40	100,110	12.50
20	72	26.50	35	110	11.20
18	72	27.50	30	110	11.70
14	72	27.25	24	72	11.95
12	72	28.25	20	90	11.55
10	60	29.50	17	72	12.10
10	48	30.00	14	72	12.55
7	60	29.75	10	60	13.80
6	60	33.25	8	60	14.25
4	40	37.00			
3	40	39.25			
2½	30	41.50			
2	24	64.00			

* Prices shown cover carbon nipples.

REFRACTORIES

Fire Clay Brick

Carloads per 1000

Super duty, Mo., Pa., Md., Ky.	$185.00
High duty (except Salina, Pa., add $5.00)	140.00
Medium duty	125.00
Low duty (except Salina, Pa., add $2.00)	103.00
Ground fire clay, net ton, bulk	22.50

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$158.00
Childs, Hays, Latrobe, Pa.	163.00
Chicago District	168.00
Western Utah	183.00
California	165.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville	163.00-168.00
Silica cement, net ton, bulk, Latrobe	29.75
Silica cement, net ton, bulk, Chicago	26.75
Silica cement, net ton, bulk, Ensley, Ala.	27.75
Silica cement, net ton, bulk, Mt. Union	25.75
Silica cement, net ton, bulk, Utah and Calif.	39.00

Chrome Brick

Per net ton

Standard chemically bonded, Balt.	$109.00
Standard chemically bonded, Curtiner, Calif.	119.00
Burned, Balt.	103.00

Magnesite Brick

Standard, Baltimore	$140.00
Chemically bonded, Baltimore	119.00

Grain Magnesite

St. ⅜ to ½-in. grains

Domestic, f.o.b. Baltimore in bulk	$73.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev. in bulk	46.00
in sacks	52.00-54.00

Dead Burned Dolomite

Per net ton

F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	$16.75
Missouri Valley	15.60
Midwest	17.00

(Effective June 1, 1959)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3***	173	190	...	...	190	9.00	9.675
Atlanta *A8***	175	192	...	214	198	8.75	9.425
Bartonville *K2***	175	192	178	214	198	9.10	9.775
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4***	177	190	172	212	196	9.00	9.70
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dav. *M4***	175	192	...	214	198	9.10	9.775
Donora, Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	...	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	...	219	203	9.10	9.775
Johnstown *B3***	173	190	174	...	196	9.00	9.675
Joliet, Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9*	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Monessen *P6*	.....	.....	.....	.....	193	8.65	9.325
Palmer, Mass. *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	...	...	213	9.60	10.15
Rankin, Pa. *A5*	173	187	...	...	193	9.00	9.55
So. Chicago *R3*	173	187	...	...	193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	236	.....	9.95	10.50†
SparrowsPt. *B3***	175	.....	.....	214	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 11-12¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Anderson, Ind. *G4*	8.95	10.40	12.60	15.60	18.55
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. *W12*	.....	10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70	.....	.....
Detroit *D1*	9.05	10.50	12.70	15.70	.....
Detroit *D2*	9.05	10.50	12.70	.....	.....
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	.....	.....
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.60	18.55
Harrison, N. J. *C11*	.....	.....	12.90	16.10	19.30
Indianapolis *R5*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C7*	11.15	12.60	14.80	17.80	.....
New Britain, Conn. *S7*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	.....
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	.....
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*	.....	10.70	12.90	16.10	19.30
Wallingford *W1*	9.40	10.70	12.90	15.90	18.55
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox	2	13	40.28	47.21	35.22
	2½	12	54.23	63.57	47.43
	3	12	62.62	73.40	54.77
	3½	11	73.11	85.70	63.93
	4	10	97.08	113.80	85.53
National Tube	2	13	40.28	47.21	35.22
	2½	12	54.23	63.57	47.43
	3	12	62.62	73.40	54.77
	3½	11	73.11	85.70	63.93
	4	10	97.08	113.80	85.53
Pittsburgh Steel	2	13	40.28	47.21	.....
	2½	12	54.23	63.57	.....
	3	12	62.62	73.40	.....
	3½	11	73.11	85.70	.....
	4	10	97.08	113.80	.....

METAL POWDERS

Cents per lb, minimum truckload, delivered E. of Miss. River, unless otherwise noted.

Iron Powders

Compacting Powders

Electrolytic, imported, f.o.b.	29.50 to 33.00
Electrolytic, domestic	34.50
Sponge	11.25
Atomized	11.25
Hydrogen Reduced	11.25 to 12.00
Carbonyl	88.00
Welding Powders*	8.10
Cutting and Scarfing Powders*	9.10

Copper Powders

Electrolytic, domestic	41.00
Precipitated	40.50 to 45.00
Atomized	39.80 to 48.30
Hydrogen reduced, f.o.b.	43.25
Bronze	47.20 to 51.50
Chromium, electrolytic	$5.00
Lead	19.00
Manganese, f.o.b.	42.00
Molybdenum	$3.60 to $3.95
Nickel	$1.05 to $1.03
Nickel Silver	53.50
Nickel Steel	13.00
Solder	13¢ plus metal value
Stainless Steel, 302	$1.07
Stainless Steel, 316	$1.26
Steel, atomized, prealloyed, 4600 series	14.00 plus metal value
Tin	14¢ plus metal value
Titanium, 99.25+%, per lb., f.o.b.	$11.25
Tungsten	$3.15 (nominal)

* F.O.B., shipping point.

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Pct. Discounts

Bolts	1-4 Containers	5 Containers	20,000 Lb.	40,000 Lb.
Machine				
½" and smaller x 3" and shorter	55	57	61	62
5/8" diam. x 3" and shorter	47	49½	54	55
¾" thru 1" diam x 6" and shorter	37	39½	45	46
¾" thru 1" diam. longer than 6" and 1¼" and larger x all lengths	31	34	40	41
Rolled thread, ½" and smaller x 3" and shorter	55	57	61	62
Carriage, lag, plow, tap, blank, step, elevator and fitting up bolts ½" and smaller x 6" and shorter	48	50½	55	56

Note: Add 25 pct for less than container quantity. Distributor prices are 5 pct less on bolts and square nuts.

Nuts, Hex, HP reg. & hvy.	Full case or Keg price
¾ in. or smaller	62
⅞ in. to 1½ in. inclusive	56
1⅝ in. and larger	51½
C. P. Hex, reg. & hvy.	
¾ in. or smaller	62
⅞ in. to 1½ in. inclusive	56
1⅝ in. and larger	51½
Hot Galv. Hex Nuts (All Types)	
¾ in. and smaller	41
Semi-finished Hex Nuts	
¾ in. or smaller	62
⅞ in. to 1½ in. inclusive	56
1⅝ in. and larger	51½

(Add 25 pct for broken case or keg quantities)

Finished	
⅞ in. and smaller	65

Rivets	*Base per 100 lb*
½ in. and larger	$12.85
	Pct. Off List
7/16 in. and smaller	15

Cap Screws *Discount (Packages)*

Full Finished H. C. Heat Treat

New std. hex head, packaged	Full Case
⅝" diam. and smaller x 6" and shorter	54 42
¾", ⅞", and 1" diam. x 6" and shorter	38 23
⅝" diam. and smaller x longer than 6"	.. ..
¾", ⅞", and 1" diam. x longer than 6"	.. ..

	C-1018 Steel Full-Finished Cartons	Bulk
¼" through ⅝" dia. x 6" and shorter	59	48
¾" through 1" dia. x 6" and shorter	45	32

Minimum quantity—¼" through ⅜" diam., 15,000 pieces; 7/16" through ⅝" diam., 5,000 pieces; ¾" through 1" diam., 2,000 pieces.

Machine Screws & Stove Bolts

Plain Finish	Discount Mach. Screws	Stove Bolts
Cartons	60	60
Bulk *Quantity*		
To ¼" diam. incl. 25,000-and over	60	..
5/16 to ½" diam. incl. 15,000-200,000	60	..

Machine Screws & Stove Bolt Nuts

	Discount Hex	Square
In Cartons	16	19
In Bulk *Quantity*		
⅜" diam. & smaller 25,000-and over	15	16

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper	
Rolled elliptical, 18 in. or longer, 5000 lb lots	46.00
Electrodeposited	38.00
Brass, 80-20, ball anodes, 2000 lb or more	51.50
Zinc, ball anodes, 2000 lb lots (for elliptical add 1¢ per lb)	18.00
Nickel, 99 pct plus, rolled carton, 5000 lb	1.0225
(Rolled depolarized add 3¢ per lb)	
Cadmium	1.20
Tin, ball anodes $1.05 per lb (approx.).	

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	65.90
Copper sulphate, 100 lb bags, per cwt.	22.75
Nickel salts, single, 100 lb bags	36.00
Nickel chloride, freight allowed, 100 lb	45.00
Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums	23.70
(Philadelphia price 24.00)	
Zinc cyanide, 100 lb	60.75
Potassium cyanide, 100 lb drum N. Y.	45.50
Chromic acid, flake type, 10,000 lb or more	30.44

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.5
Chicago	140.9
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

STEEL SERVICE CENTERS

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery‡ Charge	Sheets: Hot-Rolled (18 ga. & hvr.)	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (10 gage)††	Strip: Hot-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled (merchant)	Bars: Cold-Finished	Alloy Bars: Hot-Rolled 4615 As rolled	Alloy Bars: Hot-Rolled 4140 Annealed	Alloy Bars: Cold-Drawn 4615 As rolled	Alloy Bars: Cold-Drawn 4140 Annealed
Atlanta		8.59	9.87	10.13	8.91	9.29	9.40	9.39	13.24*	.....	.....	.....	.....
Baltimore	$.10	8.65	9.35	9.09	9.15	9.10	9.65	9.55	11.80*	16.28	15.28	19.82	19.08
Birmingham		8.18	9.45	10.46	8.51	8.89	9.00	8.99	.....	.....	.....	.....	.....
Boston**	.10	10.22[1]	11.27[2]	12.07[3]	12.17[4]	10.42[5]	10.72[6]	10.34[7]	13.45*	16.79	15.79	20.29	19.54
Buffalo	.15	8.55	9.75	11.00	8.90	9.35	9.40	9.30	11.60*	16.34	15.55	19.01	19.30
Chicago	.15	8.40	9.60	11.05	8.66	9.04	9.15	9.14	9.30	16.20	15.20	19.70	18.95
Cincinnati	.15	8.58	9.66	11.10	8.98	9.42	9.71	9.46	11.68*	16.52	15.52	20.02	19.27
Cleveland**	.15	8.32[1]	9.61[2]	11.15[3]	10.36[4]	8.76[5]	9.63[6]	9.36[7]	11.40*	16.31	15.31	19.81	19.06
Denver	.20	9.60	11.84	12.84	9.63	9.96	10.04	10.00	11.19	.....	.....	.....	20.84
Detroit	.15	8.66	9.86	11.40	9.03	9.41	9.71	9.45	9.66	15.46	15.48	18.81	19.23
Houston		8.10	8.60	.....	8.15	8.45	8.05	8.10	11.60	16.20	15.25	19.65	18.95
Kansas City	.15	9.02	10.27	11.37	9.33	9.71	9.82	9.81	10.22	16.87	15.87	20.37	19.62
Los Angeles		8.70[8]	11.20-11.80	12.20	9.15	9.10	9.00	9.10	12.95	17.30	16.35	21.30	20.60
Memphis	.15	8.55	9.80	.....	8.60	8.93	9.01	8.97	12.11*	.....	.....	.....	.....
Milwaukee	.15	8.54	9.74	11.19	8.80	9.18	9.37	9.23	9.54	16.34	15.34	19.84	19.09
New York	.10	9.27	10.59	11.40	9.74	9.87	9.84	10.09	13.35*	16.16	15.60	20.10	19.35
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia	.10	8.30	9.35	10.71	9.35	9.25	9.20	9.50	12.05*	16.58	15.58	20.08	19.33
Pittsburgh**	.15	8.32[1]	9.61[2]	10.95[3]	10.36[4]	8.52[5]	9.24[6]	8.62[7]	11.40*	16.20	15.20	19.70	18.95
Portland		10.00	11.75	13.30	11.95	11.50	11.10	9.85	15.30*	18.50	17.45	20.75	20.25
San Francisco	.10	9.75	11.20[9]	11.50	9.85	10.10	9.95	10.25	13.70	17.05	16.35	21.05	20.60
Seattle		10.30	11.55	12.50	10.25	10.10	10.20	10.50	14.70	17.15	16.80	20.65	20.60
Spokane	.15	10.45	11.70	10.90	10.65	10.25	10.35	11.15	14.85	17.75	16.95	21.55	20.75
St. Louis	.15	8.78	9.98	11.43	9.04	9.42	9.63	9.52	9.93	16.58	15.58	20.08	19.33
St. Paul	.15	8.94	10.19	11.64	8.99	9.45	9.53	9.70	10.16	.....	15.41	.....	19.21

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** Prices based on 2000 lb item quantities except for galv. sheet, c-f and alloy bars.

†† 10¢ zinc. ‡ Deduct for country delivery. * C1018—1 in. rounds. [1] 10 ga. x 36 x 96 —120; [2] 20 ga. x 36 x 96 —120; [3] 10 ga. x 36 —120; [4] 1⅛" x 1"; [5] ¼" x 84"; [6] I-Beams 6 x 12.5; [7] Rounds—¾-2 15/16"; [8] 15 ga. & heavier; [9] 14 ga. & lighter.

(Effective June 1, 1959)

(Ferroalloy prices will next appear in the June 11 issue.)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	.....
Birmingham *R3*	62.00	62.50*	.....	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	.....
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	66.50	67.00	67.50	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Everett *M6*	67.50	68.00	68.50	.....	.....
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	.....
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31-0.69 pct phos.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1*, *I4* (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $103.50; (15.51-16.00), $106.50. Add $1.00 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 18 pct. Add $1.25 for each 0.50 pct manganese over 1.00 pct. Bessemer silvery pig iron (under .10 pct phos.): $64.00. Add $1.00 premium for all grades silvery to 18 pct.

† Intermediate low phos.

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	28.00	31.50	29.00	32.75	33.25	34.50	51.25	41.50	48.25	—	22.25	—	22.50
Billets, forging	—	37.75	38.75	39.50	42.50	42.00	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	49.50	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25-31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	44.25	69.25	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	47.00	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11*; Brackenridge, Pa., *A3*; Butler, Pa., *A7*; Vandergrift, Pa., *U1*; Washington, Pa., *W2*, *J2*; Baltimore, *E1*; Middletown, O., *A7*; Massillon, O., *R3*; Gary, *U1*; Bridgeville, Pa., *U2*; New Castle, Ind., *I2*; Detroit, *M2*; Louisville, O., *R5*.

Strip: Midland, Pa., *C11*; Waukegan, Cleveland, *A5*; Carnegie, Pa., *S9*; McKeesport, Pa., *F1*; Reading, Pa., *C2*; Washington, Pa., *W2*; W. Leechburg, Pa., *A3*; Bridgeville Pa., *U2*; Detroit, *M2*; Detroit, *S1*; Canton, Massillon, O., *R3*; Harrison, N. J., *D3*; Youngstown, *R5*; Sharon, Pa., *S1*; Butler, Pa., *A7*; Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13*, (25¢ per lb. higher); New Bedford, Mass., *R6*; Gary, *U1*, (25¢ per lb. higher).

Bar: Baltimore, *A7*; S. Duquesne, Pa., *U1*; Munhall, Pa., *U1*; Reading, Pa., *C2*; Titusville, Pa., *U2*; Washington, Pa., *J2*; McKeesport, Pa., *U1*, *F1*; Bridgeville, Pa., *U2*; Dunkirk, N. Y., *A3*; Massillon, O., *R5*; S. Chicago, *U1*; Syracuse, N. Y., *C11*; Watervliet, N. Y., *A3*; Waukegan, *A5*; Canton, O., *T5*, *R3*; Ft. Wayne, *I4*; Detroit, *R5*; Gary, *U1*; Owensboro, Ky., *G5*; Bridgeport, Conn., *N8*; Ambridge, Pa., *B7*.

Wire: Waukegan, *A5*; Massillon, O., *R3*; McKeesport, Pa., *F1*; Ft. Wayne, *J4*; Newark, N. J. *D2*; Harrison, N. J., *D3*; Baltimore, *A7*; Dunkirk, *A3*; Monessen, *P1*; Syracuse, *C11*; Bridgeville, *U2*; Detroit, *R5*; Reading, Pa., *C2*; Bridgeport, Conn., *N8*.

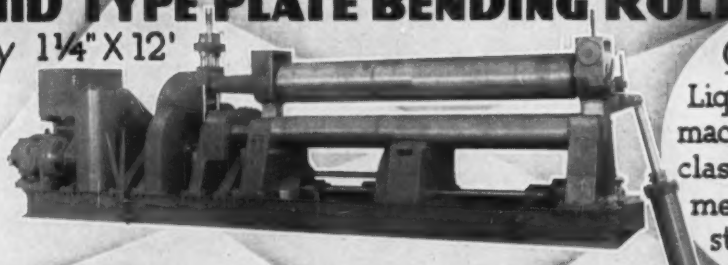
Structurals: Baltimore, *A7*; Massillon, O., *R3*; Chicago, Ill., *J4*; Watervliet, N. Y., *A3*; Syracuse, *C11*; S. Chicago, *U1*.

Plates: Ambridge, Pa., *B7*; Baltimore, *E1*; Brackenridge, Pa., *A3*; Chicago, *U1*; Munhall, Pa., *U1*; Midland, Pa., *C11*; New Castle, Ind., *I2*; Middletown, *A7*; Washington, Pa., *J2*; Cleveland, Massillon, *R3*; Coatesville, Pa., *C15*; Vandergrift, Pa., *U1*; Gary, *U1*.

Forging billets: Ambridge, Pa., *B7*; Midland, Pa., *C11*; Baltimore, *A7*; Washington, Pa., *J2*; McKeesport, *F1*; Massillon, Canton, O., *R3*; Watervliet, *A3*; Pittsburgh, Chicago, *U1*; Syracuse, *C11*; Detroit, *R5*; Munhall, Pa., S. Chicago, *U1*; Owensboro, Ky., *G5*; Bridgeport, Conn., *N8*; Reading, Pa., *C2*.

(Effective June 1, 1959)

PYRAMID TYPE PLATE BENDING ROLL
Capacity 1¼" X 12'



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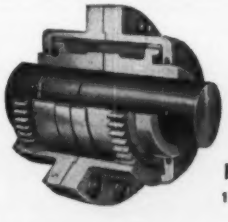

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DIRECT CURRENT MOTORS

Qu.	H.P.	Make	Type	Volts	R.P.M.
2**	3000	Whse.	Rev.	600	600
1**	2200	Whse.	Vent.	600	92/132
4**	1500	Whse.	Rev.	600	600
4**	700	Whse.	Vent.	250	300/700
2**	645	S.&S.	Rev.	300	1000
2	600	Al.Ch.	Mill	600	300/600
1	600	Whse.	Mill	250	110/220

SLIP RING MOTORS
3 Phase—60 Cycle

Qu.	H.P.	Make	Type	Volts	R.P.M.
1	2500	Al.Ch.	Mill	2200	296
1	1800	Whse.	Mill	2300	252
3	1500	G.E.	Mill	6600/4160-Y.	444
1	1000	Whse.	C.W.	2300	441
1	500	Ideal	S-4-20	4800	708
1	500	G.E.	MT-410	2200	585
1	500	Al.Ch.	ANY	2200	505
1	500	Al.Ch.	ANY	2200	293
1	400	Al.Ch.	ANY	2200	505
1	400	Whse.	C.W.	2200	290
1	350	G.E.	1-15-M	2200	1180
1	350	G.E.	MT-412	2200	450
1	300	Whse.	CW-1012	2200	704
1	300	G.E.	1-15B-M	440	1200

SYNCHRONOUS MOTORS
3 Phase—60 Cycle

Qu.	H P.	Make	Volts	R.P.M.
1	5600	Whse.	4760	1200
2	1400	Whse.	4160	450
1	960	G.E.	460	300
1	700	El.Mchy	440	200
1	500	El.Mchy.	2300	720
1	450	Whse.	220	128
1	300	G.E.	2200	600
1	200	Whse.	440	600

T. B. MAC CABE COMPANY
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Cable Address — Phone
"Macsteel" Philadelphia, Pa. Davenport 4-8300

Chicago Sales Gain Encourages Dealers

Used machinery demand continues improving in the Midwest market.

Sheet metal and toolroom equipment lead the pace, but production tool sales are also at stronger levels.

▪ Sparked by a surge in machine tool rebuild work, used tool demand in the Midwest continues to gain. Sheet metal equipment sales have also been good in the last few weeks. And Chicago dealers believe these items will be strong sellers all the way through the fourth quarter.

Prices Firming — Production equipment has been gaining more slowly. Prices in the Chicago area have been firming over the past 30 days. Since the Midwest is historically an area where dealers expect a good profit margin, the combination of rising volume and the current gain in prices, should put dealers in an improved cash position.

The upward sales trend in toolroom, production, and sheet metal equipment has already caught a number of dealers with their inventories at a low ebb. One comments: "We did an excellent level of business last month. We felt pretty good about it. But with prices moving up, and the fact that we are cleaned out of quite a bit of stock, I'd feel better if we'd hung onto some of it."

Less Haggling—Another indicator of the still-strengthening sales tempo: Buyers are less inclined to haggle over price. As late as 30 days ago, it took a hard sell to move toolroom equipment at quoted prices.

At the moment, production equipment seems to be repeating the same cycle. Sales volume is up. Prices are firm and rising. Yet the buyer is inclined to put up his hackles at the first price named. As volume rises, it's expected this mild price resistance will dwindle, as it did in the case of toolroom equipment.

Third Quarter Optimism — With rebuilding joining the upward parade, all segments of the used tool industry are showing gains. Outlook for the third quarter is optimistic. Dealers who called the turn correctly in the first quarter (predicting gains in used tool sales through the entire second quarter) are equally positive they can hold these levels or exceed them during third quarter.

Most dealers are in an improved cash position, which might account for part of the cheerful forecast. Some inventories of high-cost tools have been reduced.

Supply Scramble—If the dealer can scrape up additional inventory, he has a good chance of selling it on a quick turnover. He has more money to put into inventory. His only problem now is locating good equipment in quantity and at the right price.

If anything appears a blot on the immediate horizon, it's the question of keeping stocks of tools at good levels and in a wide selection of different equipment types.

CONSIDER GOOD USED EQUIPMENT FIRST

BENDING ROLLS
10' x 10 Ga. Bertsch No. 6 Initial Type
10' x 5/8" Bertsch No. 11 Initial Type—LATE
20' x 1/2" Niles Pyramid Type
32' x 3/4" BALDWIN PYRAMID TYPE—Late

BORING MILL—VERTICAL
62" King Heavy Duty, Two Rail Heads, One Side head, 4 Chuck Jaws, 30 H.P. Main Drive Motor

BRAKE—BOX & PAN
8' x 1/4" Dreis & Krump, 12" Finger Extension

BRAKES—PRESS TYPE
90 ton Niagara. Model 90-8-10
10' x 1/2" Dreis & Krump

CRANES—OVERHEAD ELECTRIC TRAVELING

3 ton P&H	40' Span 220 Volt D.C.
5 ton P&H	57' Span 220/3/60 A.C.
8 ton P&H	55' Span 230/3/60
10 ton P&H	39' Span 230 Volt D.C.
10 ton Milwaukee	57' Span 230 Volt D.C.
10 ton Shaw	48' Span 230 Volt D.C.
10 ton Whiting	75' Span 220/3/60 A.C.
10 ton Shaw	120' Span 230 Volt D.C.
15 ton N-B-P	100' Span 220/3/60 A.C.
30 ton Shaw	70' Span 230 Volt D.C.
120 ton Niles	67' Span 230 Volt D.C.
120 ton Shepard Niles	77' Span 220/3/60 A.C.

DRAW BENCHES
7,000 lb. Draw Bench, 51 ft. Draw
10,000 lb. Draw Bench, 50 ft. Draw
35,000 lb. Draw Bench, 41 ft. Draw

FORGING MACHINES
1" to 5" Acme, Ajax, National

HAMMERS—BOARD DROP—STEAM DROP—STEAM FORGING 800 lb. to 12,000 lb. incl.

HEADERS
#250C Manville Single Stroke Solid Die
#44 Waterbury Farrel Dble Str Open Die

LATHES
Model 22GM Monarch Geared Head, 24 1/8" Swing 48" between Centers
24" x 23' Monarch Engine Lathe

LEVELERS—ROLLER
24" Torrington, 9 Rolls 8" Dia.
66" Guide 17 Rolls 4 1/2" Dia.
72 Leveler 17 Rolls 2 5/8" Backed Up

MULTI-SLIDE MACHINE
No. 35 U.S. Multi-Slide, Max. Capy. 4 1/4" wide x .089

NIBBLER
Pullmax Model 2, Capacity 11/32"

PRESSES—HYDRAULIC
300 ton Southwark Platen 28" x 28", Stroke 25"
500 ton Watson Stillman Piercing Press, 48" x 72"
600 ton Birdsboro, Platen 48 x 48", Stroke 15"
1000 ton Southwark Bed 44" x 54", Stroke 20"
4500 ton B-L-H Bed 68 x 68", Stroke 40'

PRESS—KNUCKLE JOINT
800 ton Cleveland Model 8-K, 6" Stroke

PUNCH & SHEAR COMBINATIONS
#1 1/2 Buffalo Universal Ironworker
#2 1/2 Buffalo Ironworker
#8 Kling, 36" Throat Capacity 1 3/8" x 1"
Rock River Double End. 24" Throat. Capy. 1 1/4" x 1"

RIVETERS
150 ton Southwark Hydr., 125" Throat
275 ton R. D. Wood Hydr., 18'6" Throat

ROLLING MILLS
3 1/2" x 7" Six Roll Cluster Mill
10" x 14" Single Stand Two High
13" x 16" Single Stand Two High
16" x 24" Two Stand Two High
20" x 36" Single Stand Two High
26" x 60" Single Stand Two High
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22" x 40" Lewis 3-Hi Sheet Mill
21" x 52" x 77" Three Stand 4-High

ROLL—FORMING
18 Stand Custom Built, 2 1/2 Shaft, will take 36" wide

ROLLS—PLATE STRAIGHTENING
72" McKay 9 Rolls 15" Dia. Backed-up
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Model 122-BA Ty-Sa-Man., Capacity 8 Cuts 2" Deep at one time 15" wide, 16 ft. long

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SHEARS, MISC.
36" Hallden Drum Type, Capy. 33-38 Ga.
60" x 10 Ga. Cut-off Line
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SHEAR—ROTARY
No. 23A Quickwork Whiting 3/16" Capacity

SHEARS—SQUARING
6' x 14 Ga. Edwards, Motor Drive—LATE
10' x 10 Ga. Wysong & Miles
12' x 3/16" Cincinnati #1412

SLITTERS
24" Torrington Slitting Line, 3 1/2" Arbor
36" Waterbury Farrel Slitting Line, 4 1/2" Arbor

STRAIGHTENERS
Torrington #1734, 12-Roll, Capy. 1 3/8", Rd. 1-9/16"
#1 Sutton 5-Roll, Capy. to 3 3/8" tube, 2 1/4" solid

SWAGING MACHINE
#6A Fenn, Capy. 3 3/8" Tube, 1 1/4" Solid, 10" Die Length. With Hydraulic Feed

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.176"/.180"	C.D.	9300#
.231"/.235"	C.D.	4000#
.234"/.238"	C.D.	16500#
.257"	C.D. C.G.	5500#
.629"/.643"	HR x Coil	8800#
.715"/.731"	HR x Coil	1200#
.747"/.754"	C.D.	22500#
.758"/.762"	C.D.	500#
.812"/.819"	C.D.	24000#
.9375"	C.D. C.G.	2000#
1"	C.D.	1500#
2 1/4"	HR	1000#
3 1/2"	HR M.S.	95,000#

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268 CFM 500 psi 10-4 1/4 x 10 Ing.
311 CFM 1500 psi 10 1/2-7 1/8-3 1/2 x 13 Ing. ES-3
465 CFM 100 psi 12 x 11 Ing.
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585 CFM 100 psi 15-9 1/4 x 12 Ing. 3-60-4160
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100 HP EM Syn 3-60-440
870 CFM 125 psi 17-10 1/2 x 12 Ing. XRE 3-60-220
1055 CFM 100 psi 18-11 x 12 Ing. XRE
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Worth. portable 80'-600"

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3250 TON MESTA FORG. PRESS—New '55, like new.
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9/16" Cleveland Model A, m.d., 1943
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4 spindle 1 1/8" Cleveland, Model M, m.d.
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2 1/2" Cleveland, m.d., Model A
No. 4D Potter & Johnston, m.d., late
No. 5DELX Potter & Johnston, m.d., late
No. 5D2 Potter & Johnston, m.d.
5 3/4" Cleveland Model A Single Spindle, m.d., late

BOLT THREADERS
Victor Nut Facing Machine, m.d, cap. 3/8" to 2" nuts
1 1/2" Landis 2 spindle, m.d.
1 1/2" Landis Bolt Threading Machine, double head stay bolt, m.d.

BOREMATICS
No. 44 Heald Facing Type Borematic, m.d.
No. 47A Heald Single End, m.d.
Model DB-102 Excello Double End Boring Machine, m.d.

HORIZONTAL BORING MILLS
No. 25T Giddings & Lewis, m.d.
No. 32 Lucas Table Type, m.d.
No. 1 Cleveland Horizontal Boring, Drilling & Milling, m.d.
3 1/2" bar Cincinnati Gilbert Horizontal, Boring, Drilling & Milling, floor type
4 1/2" bar, Model 72, Niles-Bement-Pond, m.d.
5 1/2" bar Niles-Bement-Pond, m.d.
6" bar Sellers Floor Type, m.d.
Barrett Double End, 5" and 7" spindle, m.d.

VERTICAL BORING MILLS
16" Bullard Mult-au-matic, m.d.
24" Bullard Spiral Drive, m.d., 1944
36" Bullard, m.d., late 1944, Spiral Drive
36" Bullard Spiral Drive, m.d.
42" King, m.d.
42" Bullard Spiral Drive, vee belt m.d., 1944
42" Bullard New Era, m.d.
44" Putnam, m.d., p.r.t.
53" Niles Heavy Pattern, m.d., p.r.t.
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12x72" Thompson Automatic Flat Broach, m.d.
10 ton, 84" stroke LaPointe Single Ram Vertical Surface Broach, m.d., late
Type SBD-42-6 American Vertical Hy. Dup. Broach
Type SBD-48-15 American Vertical Dup. Ram Surface Hydraulic Broach

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4" Rd	Chro-Mow	2,700#
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3½" Rd	DC-33	18,300#
3½" Rd	Hot Form #1	12,800#
3½" Rd	Fire Die	1,200#
1⅛" Rd CG	Carpenter #883	15,650#
8½" x 8½"	Halcomb #218	36,450#

WATER HARDENING

Size	Trade Name	Weight
5¾" Rd	"CFS"	17,700#
5" Rd	Leco	5,900#
4¼" Rd	"CFS"	6,100#
4⅛" Rd	Crucible Dbl. Spec.	14,700#
3" Rd	Carp. "K.W."	24,000#
.655 Rd	AMS 5132	16,000#
1¾" x 1"	Silver Star	33,300#
1½" x 1"	Silver Star	1,700#

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Size	Trade Name	Weight
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1¾" x 2"	"711"	6,000#
⅞" Rd	"711"	12,500#
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7/16" Rd	"711"	1,980#

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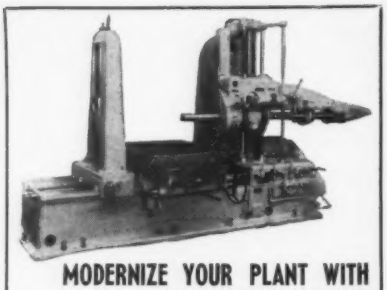

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2U SIMPLEX DOUBLE END BORER, 2 heads, 1942
DB1212 EXCELLO DOUBLE END BORER, late
BROACH, American, pull type, 18 ton 42" str.
BROACH, type XD-20-66 Oilgear, twin surface, late
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850 CFM SULLIVAN COMPRESSOR, angle compound, 125 HP
DEEP HOLE DRILL, Model 420 Barnes, 3" dia. x 96" str.
4' x 11" CARLTON RADIAL, late
221½ BARNES UPRIGHT DRILL, all geared, late
TYPE A GEAR HOBBER, Barber Colman, 1944
No. 2 CINCINNATI CENTERLESS, Filmatic, late
10" x 36" NORTON CYLINDRICAL GRINDER, type C, plunge, late
20" x 72" type D LANDIS CYLINDRICAL GRINDER, late
72A3 HEALD INTERNAL, Gagematic and Sizematic, several
12" x 48" THOMPSON SURFACE GRINDER, Horiz. spdl., late
No. 2 CINCINNATI T & C grinder, 1944
224-B BARNES VERTICAL HONE, hydraulic, 1948
58" x 16' cc LODGE & SHIPLEY LATHE, patent head, open geared
25" x 72" AXELSON LATHE, heavy duty, 1944
30" x 96" cc AMERICAN LATHE, geared head, rebuilt
No. 12 GISHOLT AUTOMATIC LATHE, hydraulic, 1945
16" x 33" cc FAY AUTOMATIC LATHE, F & R slides
No. 3 GISHOLT TURRET LATHE, universal ram type, late
No. 4 J & L TURRET LATHE, universal ram type, late
2L GISHOLT TURRET LATHE, saddle type, late
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1	2250 HP	DC MOTOR 600 V. 400/500 RPM. G.E. M.G. Set—2000 K.W. G.E. AC Motor—2300 V.
1	1500 HP	DC MOTOR 600 V. 680 RPM Whse. M.G. Set. 1500 KW G.E. 11000 V.

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1—15x20 WHEELABRATOR
1—20x27 WHEELABRATOR
2—27x36 WHEELABRATOR w/loader, 1—Steel Conveyor & 1 Rubber Belt
1—36x42 WHEELABRATOR w/loader
1—48x42 WHEELABRATOR w/loader
1—48x48 WHEELABRATOR w/loader and D/C
2—AMERICAN No. 1-A Multi-Table
1—PANGBORN Type ES-421, Shell Blast Mach.
1—PANGBORN TABLAST, 6' LK Table
1—PANGBORN TABLAST, 8' Table
10—5 to 15 Hp Hevi-Duty, Double End Grinders
1—MUMMERT DIXON 7½ Hp Sw. Fr. Grinder

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140 tons, Bliss #93½H, Bed 84"x36", Str. 16"
120 tons, Bliss #5½-48W, Bed 48"x30", Str. 8"
500 tons, Bliss #10-72, Bed 72"x64", Strs. 12"
Warco—Double Crank Bed 180"x64" Double Roll Feed, Uncoiler, Straightener 600 Tons
135 tons, Bliss #6-48, Bed 48"x30"
100 tons, Bliss #5-38, Bed 38"x28"
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